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ELASTICITY OF SUPPLY OF FARM PRODUCTS

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One of the many unexplored portions of the field of economics is the relation between price and subsequent output—what is sometimes called the elasticity of supply. We are just now passing through a period of much talk about stabilization of production, control of output and the like. Is there any other force so potent as price in causing shifts in production? But is there any one who can tell us for any one commodity in any one area what the probable effect would be of an increase of ten per cent in the price?

It was the fashion not many years ago to discuss something closely akin to this problem under the head of "necessary price," i. e., the price required to bring forth a certain volume of production alleged to be "necessary." It will be remembered that it was once thought by many people that some index of cost of production, such as "average cost of production," might be used to indicate the necessary price. The next stage in the evolution of thought on this subject was the "bulk line" idea. A price equal to average cost, when one came to think about it, would bring forth not much more than half of the necessary production, for it would leave about half of the growers producing at a loss. On the other hand, a price equal to the costs of the least successful growers would bring forth more than the necessary supply, for the reason that in all industries, and in agriculture in particular, there is a considerable volume of production at less than cost. Accordingly some cost in between these two extremes was hit upon as including

the "bulk" of the production, and this came to be called "bulk-line cost."

Three principal difficulties presently developed with this bulk-line concept. In the first place, no one could locate it. Perhaps it took a price that would equal the cost of seventy per cent of the production, perhaps eighty per cent, perhaps ninety per cent. Settling this question was, of course, the real problem, and all that this scheme accomplished was to restate the problem in a new form. In the second place, an array of one year's costs gave no adequate basis for locating the bulk-line. This is illustrated by Figure 1. For the ten years, the costs of only two of the fifty producers averaged higher than prices; but the average number per year was seven. The reason for this is that different farmers had the low costs in different years. No. 11, for example, who was eighth from the top in the ten-year average, sold for less than cost four years out of ten. A set of actual data will differ from this diagram in that it will show in addition a number of producers who stopped producing during the period because their costs continued high. It is probably this group that furnishes a good share of the "sub-marginal" production. A true bulk line, therefore, although it may show an appreciable volume of production at a loss, will not show many producers continuing in production over a ten-year period at a loss. Obviously obtaining cost data for a ten-year period for an adequate sample of producers is an almost impossible task for most research agencies. A shorter period will usually not suffice.

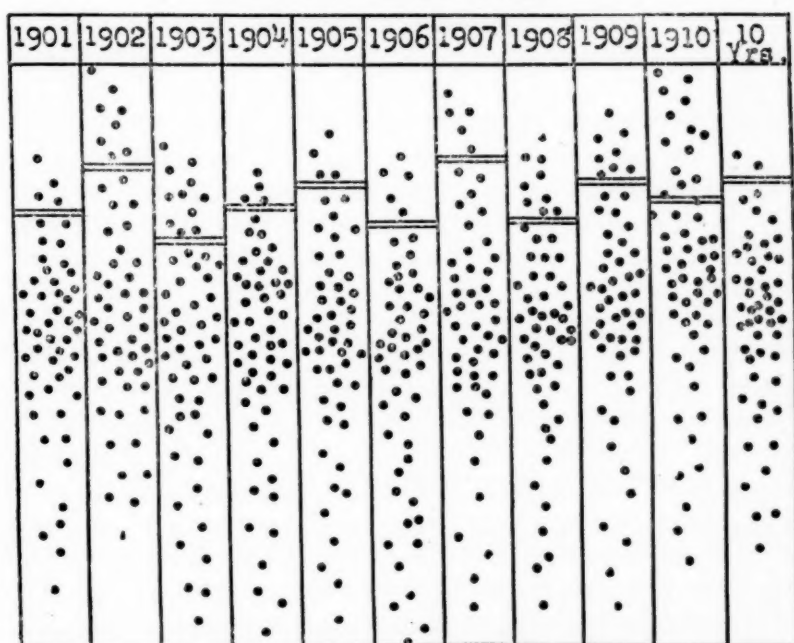
The third difficulty with the bulk-line concept was that, assuming that the data could be obtained for an adequate sample and period, all that can be concluded from it is that this particular average price or series of prices did bring forth this particular volume of production. What we are interested in knowing is how much different the volume would have been if the price had been ten points higher or lower; and twenty points higher or lower; and thirty points higher or lower; etc.

It has sometimes been thought that an array of costs would give this information directly. Take Figure 2, for example. It has been reasoned from arrays such as this that if a price of 14 cents per pound will bring forth a production of 89 millions, another cent per pound would bring forth 12 millions

more, and 2 cents per pound, 19 millions more. Now, obviously, this is a serious misapplication of such data. All the array has to offer on the point in question is that the prices prevailing at the time, combined with other factors influencing volume of production, did result in this production at this array of costs.

If the price had been 2 cents higher than this, other things being the same, what additional volume would have resulted? We cannot even guess at it from the cost array. To be sure,

FIGURE 1—HYPOTHETICAL ILLUSTRATION OF RANGE IN COSTS BY YEARS, AND AS A TEN-YEAR AVERAGE*



two more groups of producers would have been brought above the cost line, and would undoubtedly have increased their production. But the largest increase in production would surely have come from those who were already producing at a profit. And some who did not produce at all at prevailing prices

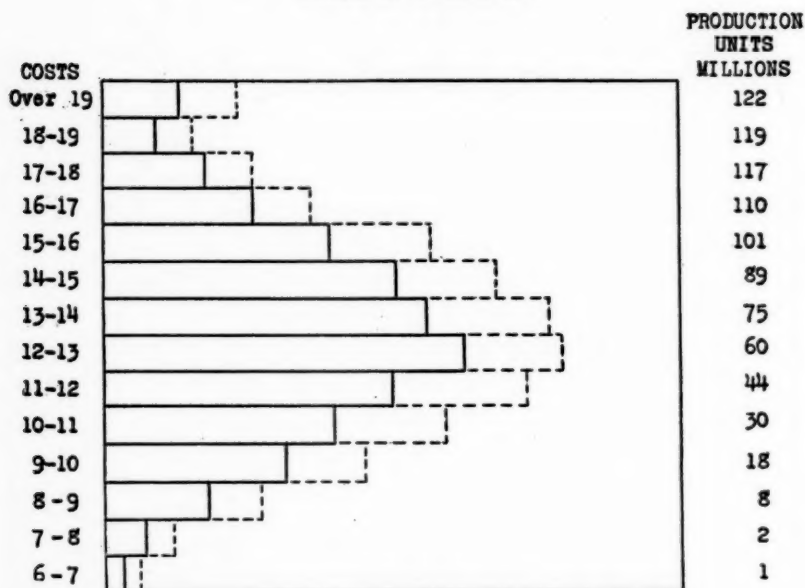
*This diagram represents no one complete set of actual data, but rather an idealized combination of a number of sets of actual data for different years, mostly for the same product.

= Parallel bars represent average price received for the crop.

would have begun producing. Perhaps the second (dotted) series of bars illustrate the origin of the new production.

The reason for this effect is that "price-sensitive" producers are found in every cost group, and just outside of every group. Some are price-sensitive because at the higher price they can add to their net farm incomes by growing more of this product and less of others, and some because they can add to their incomes by substituting this product for others. In both of these categories are all grades of producers from low-cost to high-cost. There will be those who by shifting to

FIGURE 2—AN HYPOTHETICAL ARRAY OF COSTS
VOLUME OF PRODUCTION



this product will sacrifice wide margins of profits on other products; and others who will sacrifice narrow margins of profit.

The reason that some did not produce this commodity at all before, and will produce at the higher price, is that their land, labor, management, etc., were worth more for other uses, which is equivalent to saying that their cost (including management) would have been too high. The reason that some will shift the proportions of their enterprises is that cost of

production is closely related to proportions between enterprises. The first few increments of supply of any product ordinarily cause only a small increase in cost per unit, because the farm organization is not seriously disarranged. Later increments, however, may represent a large increase in costs, for they may, for example, require disposing of livestock, or not growing all the feed for the horses, or not producing enough manure, or increasing the peak-load of horse and man labor, and also the slack periods for such labor. A true application of alternative-use value principles will show the costs of an expanding enterprise rising rather rapidly. But a rise in price of the product may more than equal these rising costs and cause important shifts in production.

Obviously, if cost of production data are to be of use in determining elasticity of supply, they must show, first, exactly at what point rising prices will make this product more profitable than its competitors, and second, what the effect of expanding one enterprise and contracting others is upon the costs of all. This calls for more refined cost methods and more careful application of the alternative-use value principle than has thus far been made. Just how, for example, would growing five more acres of corn per farm affect the per-unit man-labor and horse-labor charge for the corn crop, the oat crop, and the hay crop? and likewise the rent charges in the rotation? And yet five more acres of corn per farm would greatly affect supply and price.

It will be interesting, no doubt, to experiment with applying cost data to this problem, but it is not likely that much in the way of real results will be obtained for some time yet. As will be apparent, present methods of determining cost-rates almost completely cover up the differences in cost sought. For example, charging the same rent per acre for all crops completely conceals the fact that growing more corn and less oats on the same farm increases the corn rent and decreases the oat rent; and charging flat-rates for man-labor and horse-labor has a similar effect.

Some of the most worth-while results may be obtained more or less by way of trial or experiment. This will especially be the case with products like milk, which are produced continuously. It is likely that several of our milk producers' asso-

ciations have been sufficiently conscious of this problem and its importance so that they can now make a fair estimate as to the effect on production of a given increment in price.

The only other method of attack on the problem is the statistical one, that is, to analyze the data of changes in prices and changes in production in the past. There are a number of very great difficulties involved in the statistical attack. Chief of these is the large number of other variables in the problem. The wheat acreage may have decreased for many reasons other than a relative decline in price, such, for example, as the following: Increasing damage from pests and disease, increase in price of competing crops, improvements in varieties or adaptability of competing crops, increasing wages for harvest labor, improvements in machinery for handling competing crops. For any particular season, the acreage of corn may be greatly affected by the peculiarities of the season; for example, a late spring may have reduced the acreage of small grain and increased the acreage of corn; or a hard winter may have killed out the winter wheat or the clover seeding. The type of autumn affects the acreage of winter wheat. Some of these variations can be measured statistically and included in the correlation analysis; but some of them cannot.

A second difficulty is that farmers do not know whether prices any given year really are high or low. A price may seem high, yet really be low for the volume of production. If it were possible to determine whether prices really were high in a given year in view of the production, and were continuing high for the next year or two, and producers were all aware of this part, the response would be different from what it is now. Any response which is measured statistically must be in terms of the reactions which farmers habitually make in the present state of their enlightenment on the subject. They are not likely to judge two series of high prices alike, for the reason that no two such series will be altogether alike—they will vary in duration, level of prices, sequence of changes, causes and other accompanying circumstances.

The matter of duration is of prime importance. It is conceivable that a high price for one year only, especially if apparently to be accounted for by a low yield, would have no

effect on the acreage the succeeding year. This would be most likely to happen with a crop like potatoes. With some crops, however, high prices, even for one year, and even though entirely due to yields, do seem to have produced tangible effects on subsequent production. High prices for two years in succession will have a much greater proportionate effect, and for three years in succession, a still greater proportionate effect. The duration of the series is therefore probably as important as the amount of the change in price.

The full effects of a definite change in relative prices for a given product will take several years to appear. The fact of the time of the response is fully as important as the amount of it. In fact, what is wanted is the amount of response that follows the first year, the second year, the third year, etc. If the change in prices is merely temporary, lasting for two years, let us say, the response will be headed off before it has all happened.

The time of the response will vary for different commodities. The acreage of an annual cash crop that requires little special equipment or skill can be increased quickly. If the shift means, however, reducing the acreage of feed crops needed for an established livestock industry, it will proceed much more slowly. If it means largely revising a system of crop rotation, it will proceed more slowly. If the product is a continuous one, like milk, the output can be increased somewhat rather quickly by feeding more feed or better feed, and by milking cows that would otherwise have been slaughtered or turned over to the calves. A large increase, however, must wait upon the growing up of young stock.

There is always the strong possibility of too great a response, followed by a reaction. Price changes due to tariff protection are likely to develop in this way.

It is likely that the correlation is curvilinear, the response being more than proportionately greater with larger changes in price and longer durations of change. A multiple correlation analysis with curvilinear effects is somewhat difficult to handle. Mr. M. J. B. Ezekiel, of the United States Bureau of Agricultural Economics, has, however, developed a method which seems to be applicable to most problems of this sort.

The response may be in terms of greater intensity in cultural practices and the like, as well as in terms of increased acreages. This is in a sense a second phase of the same problem. Elasticity may be worked out in terms of effect on acreages as a separate problem. Not, however, till effect on intensity is also included will it be possible to predict change in volume of production. With annual crops, the immediate response will be mostly in terms of acreage; with perennial crops, such as orchard crops, it will be mostly in terms of intensity. The final response in both cases will be in terms of both acreage and intensity.

The practical difficulty with this problem which will be most frequently pointed out is that it is possible by propaganda to modify greatly the effect of price changes. The propaganda to increase the acreage of flax last year will be mentioned as a case in point. One of the great objects to be accomplished by such an analysis is to determine to what extent propaganda really has had any influence, and approximately what influence it has had. It is surely true that as time goes on, and this and related problems are better understood, and farmers learn from experience that production programs recommended to them by responsible extension agencies are well founded, acreages will be greatly influenced by such means. But even this influence will in due time be more or less measurable. At present so many agencies are engaging in such activities that the farmers are rightly dubious as to the value of the advice of any.

Very little statistical work has been done with this problem. Professor H. L. Moore, of Columbia, in his work on cotton, made a little headway with it. Professor Holbrook Working, of Minnesota, using the method of first differences, obtained the following coefficients between prices in the United States and acreage the following year:

Potatoes -----	+ .21	± .110	(1879-1913)
Corn -----	+ .223	± .105	(1879-1916)
Oats -----	+ .02186	± .111	"
Barley -----	+ .0517	± .1106	"
Rye -----	+ .243	± .1044	"
Sweet potatoes -----	- .2724	± .1615	(1901-1916)
Hay -----	- .1193	± .1093	(1879-1916)
Tobacco -----	- .0675	± .1733	(1901-1916)
Flax -----	+ .4216	± .1540	(1903-1916)
Cotton -----	+ .62	± .08	(1883-1913)

It will be apparent that only two of these can be considered at all significant.

Just at present the University of Minnesota is cooperating with the Division of Farm Organization of the United States Bureau of Agricultural Economics in a new attack on the problem. In the first place, the study is being confined to small areas where systems of farming are nearly uniform, with the same prices for competing crops, the same changes in cultural methods and the like. Statistical measures are being obtained for most of the important variables. In the second place, the duration of price changes and time of response are being taken into account. The correlations obtained thus far are surprisingly high.

For some purposes, information of this sort will be of most use by producing districts; for some purposes, for the United States as a whole. Whether coefficients can be obtained for the United States as a whole remains to be determined. No doubt, however, the elasticity curves for a number of the important producing districts can be combined in such a way as to indicate the country-wide effects.

In conclusion, it will be appropriate to mention a few of the interesting special applications of such data. One of these is in connection with the control of output proposals of some of our centralized cooperatives. The leaders in some of these enterprises are expecting a large increase in output to follow the greatly enhanced prices they expect to receive. An analysis such as above outlined would give them real information on this point. They would then be able to plan their program for the future more intelligently. In most cases, especially for staple crops, they would find that the increase in price likely to ensue from their efforts will not augment production enough to vex them.

Closely related to this is the problem now imposed upon public agencies of determining whether cooperative organizations have unduly enhanced the price of a commodity. If increases in price are allowed to work out their effects on production, they will expand it to a point where prices are restored to a proper level. If, however, output is restricted, then prices may be maintained on a monopoly level. The courts will undoubtedly have to define "unduly" in somewhat the same manner that they have defined "un-

reasonable." A price will be "unduly" high, or "unreasonable," if it calls forth, when undisturbed in its effects, or not disturbed to public disadvantage, more than the requisite volume of production. About the only basis available upon which to decide whether such effects have been disturbed to public disadvantage, and whether attempts to control output are unduly enhancing the price, is the test of past experience. A statistical analysis such as above outlined represents a method of summing past experience. The discussion of the limitations of the bulk-line concept makes it clear why cost of production data will not solve this problem.

Such results are also needed for any real solution of the tariff problem. It will always be the task of our "statesmen" to determine whether or not in the interests of national policy we should grow all our own wool, or seventy-five per cent of it, or fifty per cent of it. It is easy to estimate with fair accuracy what wool prices would have prevailed in the United States in the past ten years without tariff protection. Data on world prices, importation costs and the like are fairly available. With a curve of elasticity of supply one could determine, first, what production would have accompanied a free-trade policy, and, second, how much would need to be added to this price to secure whatever additional production is desired. On this basis, the principal information we would need concerning foreign production would be the probable effect on world prices of this additional production in the United States. In the case of most products, this would be negligible. A product in which it would not be negligible is flax, a relatively unimportant crop, of which our production is an appreciable percentage. Information would also be needed as to trends in production in foreign countries, because of the effect of these on the world level of prices for the various commodities. For example, the present trend of wheat production in Canada and elsewhere is establishing a lower level of the world price for wheat. The tariff protection necessary to secure a certain volume of production in the United States will be higher as the world price falls.

This method of attacking the problem of necessary tariff protection is much simpler than the method espoused by our

present Congress of trying to determine the difference between cost of production here and in the principal competing countries. Again, it is capable of being applied currently and adjusted to changing conditions as they develop so that imports can be kept definitely and constantly under control. One of the most commendable features of it is that it furnishes a basis for regulating volume of imports. If the cost-of-production formula could really be applied, it would exclude all imports.

One of the principal difficulties with applying the cost-of-production formula is that the costs obtained in the two countries will take the form of two "arrays" or frequency distributions, and no satisfactory basis has been developed for comparing two such arrays of costs for tariff purposes. If the two arrays are averaged, and the difference is applied as a tariff, there is no guarantee that domestic production will be stimulated thereby till it meets domestic consumption. The eight cents duty on butter is going to be accompanied presently by adequate home production; but probably no protection was needed to accomplish this. The only effect of the tariff has been to hasten the development. In the case of sugar, we can be sure that a tariff determined on this basis will not secure complete domestic production. The same is true for wool. Bulk-line costs will be higher than average costs, but the differences between bulk-line costs in two countries are as likely to be smaller as larger than differences between average costs. A tariff high enough to secure complete domestic production must be high enough to secure a price that will include the reservation prices of all the producers who are needed to supply the domestic requirements. Nothing will give this information but a curve of elasticity of supply.

Lastly, it may be information for some readers of this Journal that the method here outlined furnishes a sound economic basis for determining the tariffs necessary to secure complete domestic production, or any proportion thereof, whereas the method based on differences between the cost of production at home and abroad is bad economics and thoroughly unsound. It is, in fact, a political and not an economic theory, using political in its popular sense. And this is entirely aside from the question as to whether a protective policy itself is good economics.

AGRICULTURAL FORECASTING*

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Since we are living in a dynamic society where economic conditions and consequently prices and price relations are ever changing, it follows that our decisions and business judgments are based largely upon forecasts. A forecast is a statement of what may be expected to happen, based upon present conditions and observations interpreted in the light of previous experience; and is the basis of deciding what action to take in order to secure a desired end. A scientific forecast is one made on the basis of a discovered systematic sequence of normal experience.

Farmers of necessity must think in terms of future possibilities. In the light of their knowledge of the physical and economic environment they decide what they will undertake to do for the coming year,—how much land they will use, the acreage they will put into each of the various crops and the livestock they will keep as a part of the farming operations. Farmers are not the only ones who make agricultural forecasts. Many merchants who deal in farm products give even more attention to agricultural forecasting than do farmers. In so far as the economic factors are concerned farmers too generally determine how much they will produce next year of a given crop on the basis of present prices rather than prospective prices. As a result they have often planted high-priced seed, and used high-priced fertilizer, labor and land in increased quantities, and sold the increased quantities of product at low prices and, in turn, planted lightly of low-priced seeds and used little fertilizer and had a small production to sell at high prices.

The buyers of farm products take into account not only available supply, but the probable future supply of the product which may be forthcoming. If there is a ten per cent surplus of the product of one year to be carried over to the next year, the buyer of this surplus naturally bases the price he is willing to pay upon the probable price he will be able to secure the

* Read at the meeting of the American Farm Economic Association, December 27, 1923, 8.00 p. m., Washington, D. C.

next year and this he bases on the forecast of what will probably be produced the next year.

While forecasts have always been made by farmers and merchants, and will continue to be made, it is believed that agricultural forecasting can be made more accurate by making statistical analysis of historical data in an attempt to discover a systematic sequence of events and to determine the variation in, and probable error of this routine of experience. Also the collecting of materials and data will add greatly to the usefulness of our forecasting base. Furthermore, knowledge of the intentions of others, who likewise are contemplating the making of readjustments, will improve the basis of passing judgment. The purpose of agricultural forecasting is the wise guidance of production in order that there may continue to be a proper balance between the various lines of production and between agriculture and other industries. Agricultural prosperity in general depends primarily upon the ability of farmers to anticipate the future.

Forecasting can be viewed not only from the standpoint of the individual farmer and the merchant dealing in farm products, but also from the national point of view—the supply of food and raw materials for the Nation throughout a series of years. From the individual point of view, forecasting is the basis of wise farm and marketing practices. From the national point of view it is the basis of a national agricultural policy.

The Department of Agriculture is progressively improving the basis of agricultural forecasting. The estimating of the acreage of crops that had been planted and the condition of crops at given periods while in progress of growth naturally led to forecasting the resultant in bushels or bales. These forecasts were particularly valuable from the standpoint of adjusting prices on the basis of probable supply and demand. In the absence of knowledge of the prospective supply, prices may be very much too high or very much too low, for it is not supply and demand but what people think the supply and demand are or will be that makes prices. The more accurate the forecast, the more steadily we may pass from the sale of one year's crop to another without violent price fluctuations.

While knowledge of the amount of product which has been produced is valuable to the farmer in selling his product, it is not of very great advantage to him at planting time in determining what changes he should make in his production with a view to giving more intelligent direction and greater stability to agriculture in this unsettled period when readjustments are in danger of resulting in violent movements from one line of production to another, estimates have been made of farmers' intentions to plant the various crops or to breed the various kinds of livestock. The idea has been to secure this information and publish it early enough to give farmers opportunity to make changes in their plans. It is important not only that farmers have a knowledge of what their fellow farmers are planning to do in the way of increasing or decreasing given lines of production which may affect the supply side of the equation, but also it is important to have some forecast on the demand side of the equation. I shall attempt to describe, briefly, some of the efforts which have been made within the last year to give the farmer better information both in respect to probable supply and probable demand, as a basis of determining his line of action in the production and marketing of his products.

Estimates of the number of spring pigs raised give the basis for forecasting the number of hogs which will appear in the markets during the following fall and winter.

In June, 1922, the first spring pig estimates were made. The information for this report was gathered in cooperation with the Post Office Department through its rural mail carriers who secured reports from over two hundred thousand farmers in the Corn Belt States. These reports showed an increase in spring pigs over the previous year of 22.8 per cent for those States. The receipts at the stockyards for the period beginning in October of that year when the spring pigs started to market and ending in April when the bulk of this crop of pigs had been marketed, showed an increase of 23 per cent over the previous year. A similar report was made in December, 1922, which showed an increase of 21 per cent in fall pigs, which agreed exactly with the increase in receipts at stockyards during the next summer when these pigs reached the market.

The first "intention survey" was made in connection with the pig estimates of June, 1922. This report showed an intention on the part of farmers to increase breeding for fall litters to the extent of 49 per cent above that of the previous year. As one studied the situation, this was rather what should have been expected from the price relations which existed between corn and hogs. Hogs had been high in proportion to the price of corn and any one who has studied price trends for a series of years knows the tendency of farmers to overdo hog production when hogs are high relative to corn and overdo corn production when corn is high relative to hogs. With these facts in mind cautions were issued in 1922 against such a large increase in the fall pig crop. Whether these cautions had any influence or not, it is nevertheless true that the actual number of sows farrowing in the fall of 1922 was 28 per cent above that of the previous year, instead of 49 per cent as was originally indicated. The December report also showed an intention to breed 13.1 per cent more sows for spring pigs while the actual increase in breeding, as reported June, 1923, was only 3.9 per cent. The report made last June also showed an intention to increase the number of hogs bred for fall pigs this fall by 28.3 per cent. This fact was given wide publicity, and judging from the receipts of sows at markets, it is to be expected that when the next survey is issued, about the middle of January, it will, most likely, show that this intended increase has been very materially reduced if it has not altogether disappeared.

The objective of the Department of Agriculture in these reports is to give such information with regard to farmers' intentions to produce hogs and plant corn on the one hand and the world market conditions on the other, as will enable them, in the light of the knowledge of what has happened in the past with regard to violent fluctuations in the relations of the prices of hogs and corn, to forecast the true situation and maintain a proper balance between hogs and corn.

Not only is the Department reporting the intentions of farmers with respect to the number of brood sows they are planning to keep, but it is making reports on the intentions of farmers to plant crops. Reports covering spring sown

crops were issued in April, 1923, and indicated the intentions of the farmers with respect to planting cotton, corn, spring wheat, oats, tobacco, etc. Upon an examination of the reports on intentions to plant compared with estimates of actual planting issued later, it was found that there was rather a close resemblance in most of the crops, tobacco excepted, between the figures showing the intentions to plant and the figures showing estimated planting. These reports should of course resemble one another except when they show that readjustments are needed because of a tendency to over or under-plant.

The figures shown by the intentions survey were considered by the Committee on Agricultural Outlook, which met in April, 1923. When they considered these figures they looked upon the increase of 10 per cent in the tobacco acreage over the previous year, with its accumulative effect owing to the fact that it was also 55 per cent above the pre-war average, they gave a definite warning to tobacco producers in a statement which reads as follows:

"There is nothing in the probable demand sufficient to offset the contemplated increase of 10 per cent in planted acreage, particularly when we consider that the 1922 acreage was above the normal, and that the trend of prices since 1920 has, on the whole, been downward."

Whether or not this statement was the occasion of the change in the farmers' idea of what to do, the July estimate showed an increase in tobacco acreage of only 2.1 per cent instead of 10 per cent.

The purpose of the committees on Agricultural Outlook was not only to make a forecast based-upon the best materials the Department of Agriculture was able to assemble and such evidence as the several members of the committees were able to bring with them with regard to the trend of affairs in the production of certain crops and certain kinds of livestock, but also to make a statement regarding the outlook with respect to demand for farm products. It is believed that statisticians and economists who are continually studying world economic relations and who should have the composite judgment of large numbers of business men throughout the country with regard to what will probably happen in the relatively near future in business conditions,

can add greatly to such material as the Department of Agriculture can secure in providing a basis of judgment for the American farmer upon which to plan his next season's work.

The second estimate of intentions to plant was made in August, 1923, covering fall sown crops and was followed by the report of the second committee on the Agricultural Outlook.

In the main, the reports of the two Agricultural Outlook committees have been received with favor.

It will take some time to fully develop the reports on Agricultural Outlook, but it is believed that in the course of a few years these reports can be very much improved and farmers will learn how to make use of them in such a way as to make this phase of agricultural forecasting extremely valuable to the American farmer.

Students of this problem will be interested to know that among the important projects which the Bureau of Agricultural Economics has now under way is one designed to furnish a method of presenting statistics of supply and demand and which will make it possible more accurately to determine the significance of these statistics as indicators of current price conditions and price conditions of the immediate future. Price changes do not exactly coincide in time with changes in underlying supply and demand conditions. Weeks and perhaps months may elapse before a shortage or any oversupply of any farm commodity is reflected in a change in its price. The Bureau is attempting from a study of price, production and business statistics to determine what is the normal "lag" in the case of leading agricultural products between changes in the supply and demand conditions and changes in price. Results already attained indicate that the effort will be successful.

Studies of price movements of hogs and cotton show that certain demand and supply figures anticipate the price movements several months in advance with remarkable uniformity. Investigation into price movements in other lines is expected to show similar uniformity.

The historical and statistical analysis of supply and demand and price movements supplements the work being done in the field of crop and livestock estimates, particularly with respect to the demand side of the problem and will do much to provide

a better basis for passing judgment on the agricultural outlook.

The systems and methods of forecasting which I have been discussing have reference largely to the problem of throwing more light on the immediate trends in conditions that determine the prices of crops and livestock. It is also highly important to be looking ahead in order to determine the long-time trend with respect to agricultural development. It may be true that the long-time trend is obscured by existing short-time trends. For instance, the temporary depression in the prices of certain farm products makes it appear that farm land is superabundant, and has tended to make the public forget the steady decrease for more than two decades in the acreage of crops and livestock per capita.

Recognizing the importance of considering the long-time trend the Secretary of Agriculture has appointed a special committee on Land Utilization. The committee is bringing together the facts with regard to the past trend and the future outlook during the next three or four decades with respect to crop and pasture acreage, per capita and total consumption, exports and imports, and changes in productivity per unit of land area. These lines of study are being focussed on the objective of trying to determine the probable requirements of land for crops, pasture, and forests, for it is recognized that these three uses are to some extent competitive for our available land area. The committee is also studying the adaptability for the three uses mentioned of the land not now in crops.

Closely related to the task of long-time forecasting is the problem of looking ahead with reference to the probable course of prices of agricultural products and the prices of farm real estate. Such forecasts are important not only in order to enable farmers to invest wisely and plan correctly their business, but also in order to aid mortgage bankers, land settlement agencies, and other business concerns which are compelled to risk billions of dollars under conditions of extreme uncertainty as to the future course of the basic economic conditions which determine the security of their investments.

Like all kinds of forecasting, the attempt to study the long-time trends is subject to the uncertainty of future events, but

in some regards probably to no greater extent than is the case with short-time forecasting. At any rate, the long-time forecast provides a well-considered outlook on the probabilities, and an intelligent basis for determining state and national policies with respect to immigration, foreign trade in farm products, forestry, reclamation, and land settlement.

While agricultural forecasting by public agencies is a new thing, substantial progress is being made and it is believed that if the work in this field is confined largely to the collection and dissemination of facts which give the basis of judgment on the part of farmers and others in making decisions for themselves, the benefits will be very great. It will put farmers as a class more nearly on an even basis with those in other industries in deciding whether to continue in accordance with their old plans or to readjust their production, owing to permanent changes which may have taken place in marketing conditions. Thoughtful students should give careful attention to this new field of work.

DISCUSSION

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In the brief time I have had to review Dr. Taylor's paper I find myself in hearty accord with his analysis of agricultural forecasting. I am glad to align myself with Dr. Taylor's definition of forecasting. It is so well stated that it will bear repetition. "A forecast is a statement of what may be expected to happen, based upon present conditions and observations interpreted in the light of previous experience; and is the basis of deciding what action to take in order to secure the desired end."

Patrick Henry once remarked that the only light that guided his feet was the lamp of past experience. Our forecasts are "made on the basis of a discovered systematic sequence of normal events." Our predictions are based on past experience and on the expectation that events will follow one upon another in sequence such as we have previously experienced. Not, of course, with certainty, but with such a high degree of probability that we can attach considerable significance to them.

Dr. Taylor has correctly pointed out that agricultural forecasting can be made more accurate by making statistical analysis of historical data—to discover a systematic sequence of events. This is paramount to intelligent forecasting, whether it is forecasting for the farmer, merchant, or nation.

Forecasting has swept over the country during the last two years like a fire on the open prairies. During these trying times the Bureau of Markets, Farm Management and Crop Estimates were consolidated into one group, the Bureau of Agricultural Economics, and Dr. Taylor became director of the world's most important forecasting institution. The magnitude of this institution escapes our attention. Indeed, we have been forecasting crop production so long that we take it as a matter of course and minimize its importance. Last year the Bureau made about 50,000 estimates at a cost of about \$400,000, or \$8.00 per estimate per state. Compare this with the innumerable services at \$100 per year. Since Dr. Taylor has had charge of this great forecasting institution notable contributions have been made, namely, the pig survey, intentions to plant, and supply and demand and price studies. Careful studies have been made of methods of forecasting acreage from price changes and condition of crops from weather data. Objective methods, such as road meters and field counts have been introduced to determine more accurately changes in the acreage of crops—the most difficult problem of the crop forecaster.

Changes in political boundaries have increased the difficulties of the foreign crop reports. The adjustment of present acreage to comparable prewar areas is no mean task. Those who know how hard it is to inaugurate new work in a governmental organization will appreciate the expenditure of effort necessary to make these contributions.

There is much difference of opinion on what and when and how to forecast, but so long as the world eagerly awaits and accepts crop estimate, pig survey, and intention to plant, we may expect the work to progress. The agricultural forecaster has an endless array of phenomena to overcome. Changing climatic conditions, prejudiced farmers, enterprising Congressmen, and radical farm leaders as well as the normal fluc-

tuations that arise from random sampling are sufficient stimulus to keep the work on a high plane.

There are few individuals who do more forecasting than farmers. They must form their opinions of prevailing conditions and shape their hourly, daily, weekly and yearly programs of action upon past experience, the farmer's only guide. Too frequently the farmer is better acquainted with his own past experience and that of his immediate neighbors than with the experiences of the various national groups of farmers producing competing products in other parts of the nation or world.

The agricultural colleges and the United States Department of Agriculture can assist the farmer to forecast the events of his locality by means of farm survey studies that will acquaint him with the best procedure in his community and will in turn enable him to adjust his plans to the ever-changing condition with the least friction. These agencies should also keep the farmers informed on important changes in production in nearby and distant regions.

If economic friction did not exist and it was not normal for individuals to be abnormal the fluctuations of agricultural production and prices would be less and forecasting would not be so essential. Until we reach the millennium there surely can be no dissent from Dr. Taylor's emphasis upon the necessity for further studies of forecasting, despite the criticism and mistakes that will arise.

INTERNATIONAL YEARBOOK

A limited number of copies of the 1922 International Yearbook of Agricultural Statistics published by the International Institute of Agriculture at Rome have been received by the Editor of the Journal for sale in the United States. Anyone desiring copies should address the Editor, Journal of Farm Economics, Bureau of Agricultural Economics, Washington, D. C., enclosing check or money order for \$2.10 to cover cost and postage. The book contains world statistics of acreage, production, and trade of the principal agricultural products, commercial fertilizer statistics, numbers of livestock, prices and ocean freight and foreign exchange rates. All explanatory text, notes and table headings are printed in English, weights and measures in metric system.

LAW OF THE DIMINISHING INCREMENT IN THE FATTENING OF STEERS AND HOGS*

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In a previous article in this Journal I pointed out that for a single variable factor the equation for the law of the diminishing increment takes the form

$$y = A(1 - R^x), \quad (1)$$

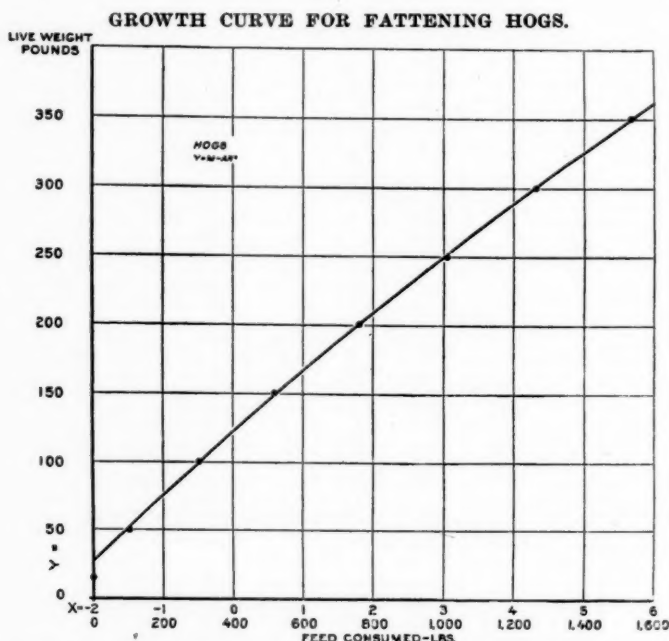


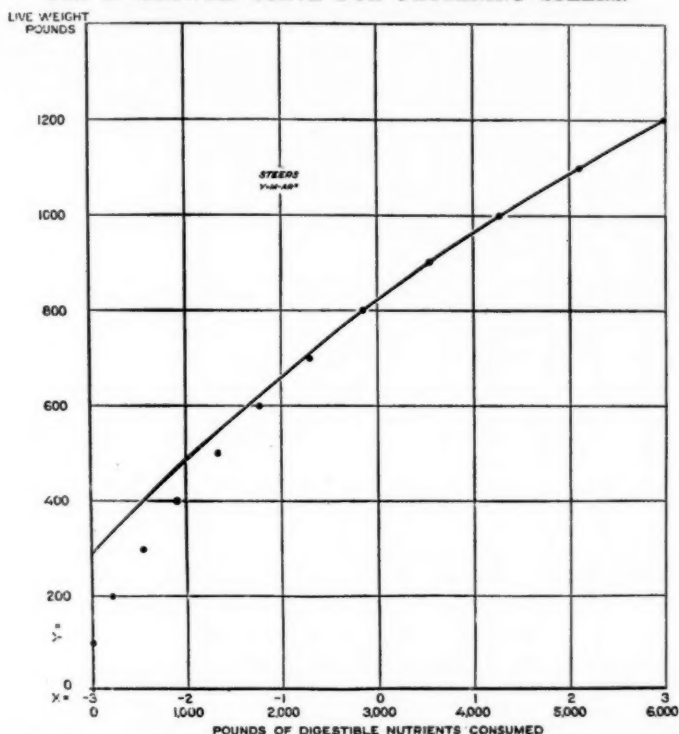
FIG. 1.—THE DOTS ARE OBSERVED, THE CURVE CALCULATED WEIGHT.

in which y in the increment in yield (or weight) corresponding to an increase of x units in fertilizer applied (or feed consumed), A is the total increase possible under the conditions, and R the ratio of the decreasing geometrical series of which the terms are the increments in y due to successive unit incre-

* Paper read before the American Farm Economics Association, December 29, 1923, revised so as not to duplicate the previous article in the Journal on this subject. Jour. Farm Econ., January, 1923, "Application of the Law of Diminishing Returns to Some Fertilizer and Feed Data." This subject is treated in more detail in Part I (by Spillman) in Spillman and Lang's "Law of Diminishing Returns," World Book Co., Yonkers, N. Y. (in press).

ments in x . It was there shown that this equation may be converted into the form (see Chart 2)

FIG. 2.—GROWTH CURVE FOR FATTENING STEERS.

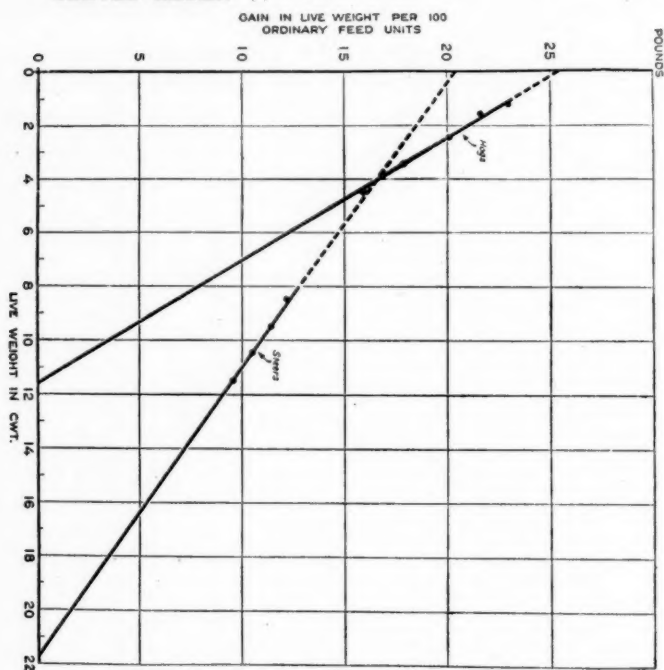


$$Y = M - AR^x, \quad (2)$$

in which Y is the actual yield per acre (weight of animal) when x units of fertilizer are applied (x units of feed have been consumed), M the maximum value of Y under the conditions of the experiment, A and R having the same significance as before.

Since the publication of that paper I have learned, through the courtesy of Mr. Henry Schultz, of the Institute of Economics, Washington, D. C., of an easy method of applying the principle of least squares to the evaluation of the constants in the above equations. It is as follows: Let z represent the increment in Y corresponding to a unit increment in x . Then (see Chart 3)

FIG. 3.—RELATION OF WEIGHT OF ANIMAL TO RATE OF GROWTH PER 100 FEED UNITS. THE DOTS ARE OBSERVED RATES.



$$Y + z = M - AR^{x+1}. \quad (3)$$

Subtracting (2) from (3), member by member, we have

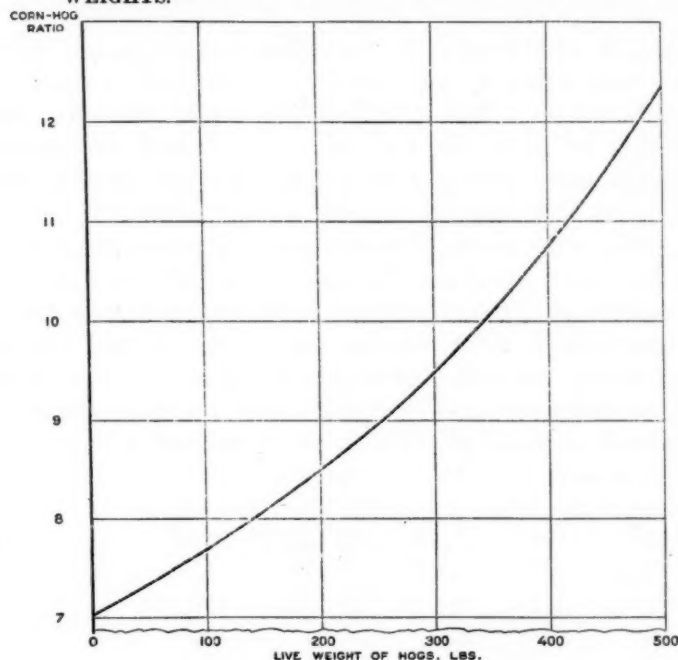
$$z = AR^x - AR^{x+1} = AR^x(1 - R).$$

Taking the logarithm of each member of this last equation, we have (see Chart 4)

$$\text{Log} z = x \log R + \log A(1 - R). \quad (4)$$

The principle of least squares may now be applied to finding the most probable values of $\log R$ and $\log A(1 - R)$. The value of M is then found by adding to A the most probable value of Y_0 , which is the average difference between the calculated gains and the actual weights of the animal for the various values of x .

FIG. 4.—RELATION BETWEEN CORN-HOG RATIO AND THE MOST PROFITABLE WEIGHT OF FAT HOGS, ASSUMING THE SELLING PRICE TO BE THE SAME AT ALL WEIGHTS.



Application to Hog Feeding

In the first edition of his great work on Feeds and Feeding, Henry gives (p. 551) the amounts of feed required per hundred pounds of gain for hogs between liveweights 15 and 350 lbs. These data are a summary of experiment station work on fattening hogs up to about 1897. Henry's data are given in the accompanying table (first three columns). The last three columns of this table are calculated directly from the first three.

DATA ON FATTENING HOGS

Initial and final weights lbs.	No. of animals fed	Feed per 100 lbs. gain lbs.	Feed per period lbs.	Feed since liveweight was 15 lbs. lbs.	Same in units of 200 lbs. each
15- 50	174	293	102.5	102.5	.5125
50-100	417	400	200.0	302.5	1.5125
100-150	495	437	218.5	521.0	2.6050
150-200	489	482	241.0	762.0	3.8100
200-250	300	498	249.0	1011.0	5.0550
250-300	223	511	255.5	1266.5	6.3325
300-350	105	535	267.5	1534.0	7.6700

In order to be able to apply the method of least squares to these data it is necessary, in order to obtain the values of the constants in our formula, to know the weights of the animals (Y) corresponding to integral (whole number) values of x. To obtain these we first construct a graph of the data, using liveweights as ordinates and amounts of feed as abscissas. The small circles in Fig. 1 show the observed weights corresponding to the values of x given in the above table (last column). We now draw a smooth curve through these circles (this curve is not shown in the figure), and on this curve read off the values of Y corresponding to the integral (whole number) values of x. The results are shown in the following table, in which are also shown the values of z (increments in Y corresponding to unit increments in x), the values of z being placed opposite the values of x from which the unit increments begin:

x	Y	z
0	15	59
1	74	48
2	122	45
3	167	42
4	209	41
5	250	38
6	288	38
7	326	—

As will be shown later, all young animals that consume milk grow at a rate far in excess of that called for by our formula. The weights of these pigs begin at 15 lbs., at which time we may assume that they are suckling. The excessive rate of growth due, apparently, to the fact that milk has for young animals a much greater feeding value than that with which it has been credited, does not disappear till a weight of about 100 lbs. is reached. For this reason we shall use only the last five values of z in calculating the value of the constants of the formula. In making these calculations by means of least squares, we first substitute in equation (4) corresponding values of x and z. Since we have five pairs of such values, this gives us five "observation" equations, as follows: (the corresponding values of z, Y, and x, being given for convenience of reference).

x	Y	z	
0	15	59	
1	74	48	$\text{Log} z = x \log R + \log A(1-R)$
2	122	45	$1.6532125 = 2 \log R + \log A(1-R)$
3	167	42	$1.6232493 = 3 \log R + \log A(1-R)$
4	209	41	$1.6127839 = 4 \log R + \log A(1-R)$
5	250	38	$1.5797836 = 5 \log R + \log A(1-R)$
6	288	38	$1.5797836 = 6 \log R + \log A(1-R)$
7	326	—	

This gives us five equations between two unknown quantities. In general, values of two unknowns that will satisfy more than two independent equations can not be found. The best we can do, therefore, is to find the values of $\log R$ and $\log A(1-R)$ that will come nearest satisfying these five equations; that is, the "most probable" values of these two unknowns. This the principle of least squares enables us to do. It enables us to reduce the five equations to two. The first step in the process is to multiply each of the five equations through by the coefficient of $\log R$ in that equation. This gives five new equations, which we add together, member by member, thus obtaining a single equation which is called the "normal equation" for $\log R$. The normal for $\log A(1-R)$ is found in a similar manner. But the coefficient of $\log A(1-R)$ is unity in each of the observation equations. Hence multiplying through by the coefficients of $\log A(1-R)$ does not change them, and we get the normal for $\log A(1-R)$ simply by adding the observation equations as they stand. This gives us the two normal equations

$$\begin{aligned} 32.0049281 &= 90 \log R + 20 \log A(1-R) \\ \text{and} \quad 8.0488129 &= 20 \log R + 5 \log A(1-R). \end{aligned}$$

Solving these two equations by the ordinary methods of algebra, we find

$$\begin{aligned} \log R &= -.01903235, \text{ whence } R = .9571228, \\ \text{and } \log A(1-R) &= 1.6858920, \text{ whence } A = 1131.53. \end{aligned}$$

This means that the maximum gain these hogs were capable of making is 1131.53 lbs., and that the gain on any 200 lbs. of feed is 95.71228 per cent of the gain made on the preceding 200 lbs.

Substituting the above values of R and A in equation (1), and then substituting for x the series of values given in the last column of the table of original data, we find for y the series of values given in the second column of the following table:

x	y	Obs. Y	Y ₀	Calc. Y	Dif.	% Dif.
.0000	.00	15		26.55	11.55	
.5125	25.13	50		51.68	1.68	
1.5125	72.57	100	27.43	99.12	— .88	— .880
2.6050	122.08	150	27.92	148.63	— 1.37	— .913
3.8100	174.00	200	26.00	200.55	.55	.275
5.0550	224.84	250	25.16	251.39	1.39	.556
6.3325	274.21	300	25.79	300.76	.76	.253
7.6700	323.02	350	26.98	349.57	— .43	— .123
6) 159.28						
26.55						

The above values of y are the theoretical gains since the feeding began. The difference between them and the corresponding observed weights (third column) is the theoretical initial weight of the hogs. The average difference is 26.55 lbs. Adding this theoretical initial weight to the gains, we obtain the figures shown in the fifth column, which are the calculated weights. Within the limits for which the values of A and R were obtained, the calculated weights agree with the observed weights with an error of less than 1 per cent of the observed weights, which must be considered fairly good agreement between theory and fact. The agreement is actually somewhat closer than these figures indicate for the reason that the necessity of graphing the data to obtain values of Y corresponding to whole number values of x introduces a small error into the work. The necessity of graphing the data for this purpose would be avoided if experimenters would report the weights of animals for the whole number values of x (feed consumed).

The figures in the table indicate that if the rate of growth throughout had obeyed the same law it did after a weight of 100 lbs. was reached, the pigs would have had to start with a weight of 26.55 lbs. instead of the actual weight of 15 lbs. During the stage at which we may assume they were consuming more or less milk, and for a considerable period afterwards, their rate of growth was considerably higher than called for by theory. The reasons for this will be discussed after the data for steer feeding have been presented.

Application to Steer Feeding

In Minnesota station bulletin 193, Prof. T. L. Haecker reports the results of feeding a large number of steer calves from the time their weight was 100 lbs. till they attained a weight of about 1,200 lbs. His data are given by 100 lb. liveweight intervals. The amounts and kinds of feed used during each of these intervals are given, as are also the pounds of digestible nutrients consumed for each 100 lbs. of gain in liveweight. In a former article* I gave the application of our formula to this experiment, using for values of x the number of ordinary feed units consumed, reducing the various feedstuffs to units on the Wisconsin system of feed units. I give below similar data in which the unit of x is 1,000 lbs. of digestible nutrients. The experimental data were:

Feeding period	Weights of Animals Initial	Final	Digest. nutrients consumed lbs.	Total digest. nutrients lbs.
1-----	100	200	225	225
2-----	200	300	318.6	543.6
3-----	300	400	376.4	920
4-----	400	500	429	1349
5-----	500	600	426	1775
6-----	600	700	529	2304
7-----	700	800	553	2857
8-----	800	900	708	3565
9-----	900	1000	731	4296
10-----	1000	1100	808	5104
11-----	1100	1200	885	5989

Here again, the data are given for equal increments in weight. In order to apply the method outlined in the preceding discussion these data must be graphed and the data thus transformed into weights for equal increments in feed consumed. When the work is done in all respects as in the case of hogs already considered, and the values of A and R are calculated for liveweights above 800 lbs., the results are as follows:

x	y	Obs. Y	Y_0	Calc. Y	Dif.	% Dif.
.000	.00	100		296.66	196.66	
.225	45.31	200		341.97	141.97	
.5436	107.64	300		404.30	104.30	
.920	178.62	400		475.28	75.28	

* Journal of Farm Economics, January, 1923.

x	y	Obs. Y	Y _o	Calc. Y	Dif.	% Dif.
1.349	256.14	500		552.50	52.80	
1.775	329.70	600		626.36	26.36	
2.304	416.53	700		713.19	13.19	
2.857	502.25	800	297.75	798.91	-1.09	-.136
3.565	604.90	900	295.10	901.56	1.56	.173
4.296	703.10	1000	296.90	999.76	-.24	-.024
5.104	803.14	1100	296.86	1099.80	-.20	-.018
5.989	903.31	1200	296.69	1199.97	-.03	-.00025
			5)1483.30			
			296.66			

After the animals had attained a weight of 800 lbs. the table shows that their weights at no time departed from the calculated weights by as much as two-tenths of one per cent. It is fair to say, therefore, that beyond a weight of 800 lbs. the gains made by these animals are represented with a high degree of accuracy by the formula for the law of the diminishing increment. (See Fig. 2.)

If the feeding had continued as long as gains were possible, and if the gains had continued to obey this same law, the ultimate weight these animals could have attained is 2,217.63 lbs. The corresponding figure for hogs is 1,158.08 lbs. These weights are to be compared with the heaviest animals at the fairs. Occasionally a steer attains a much greater weight than this, but it is believed that this is due to abnormal conditions.

The amounts of milk and skim milk fed these steers were as follows:

First period:	skim milk	875 lbs.;	whole milk	207 lbs.
Second "	"	"	550 "	
Third "	"	"	153 "	

The table shows that previous to the time when they had attained a weight of 800 lbs. the rate of gain of the animals was much greater than called for by the formula. Had their gains obeyed throughout the law they did after a live-weight of 800 lbs. was reached the calves would have had to weigh 296.66 lbs. at the beginning of the feeding in order to have attained the weights they did attain. While the feeding of milk ceased before a weight of 400 lbs. was reached, the excessive rate of gain continued, at a diminish rate, until the calves weighed nearly twice this amount. It is, of course, well known that a change in ration may cause a change in the rate of gain. The only material change in the feeding in this case was in the milk part of the

ration. If we may attribute the excessive rate of gain in the early stages to the effect of the milk, then it is clear that for young animals like these, milk has a much higher feeding value than that with which it is ordinarily credited. The excess gains of these calves amounted to 196.66 lbs. per head. It should have required 918.8 lbs. of digestible nutrients for this excess gain. If therefore we may attribute the entire excess gain to the milk, we find that a total of 1,578 lbs. of skim milk and 207 lbs. of whole milk have a feeding value in excess of that which they are usually credited equal to that of 918.8 lbs. of digestible nutrients, which is at the rate of .51 lb. per pound of milk (whole and skim—mostly skim). This is nearly seven times the value ordinarily accredited to skim milk.

It may be that the excessive rate of growth of these young animals is due to some other cause. If it is due to the milk, we have here a suggestion of experimental work that might result in findings of great value to the dairy industry.

If the higher rate of gain was due to the vitamins in the milk, or, as Mr. Ezekiel, of our bureau, suggests, to the high percentage of protein in the digestible nutrients of milk, particularly in skim milk, we should expect the effect to continue for some time after the feeding of the milk ceased, just as was the case. It may be due to the fact that milk contains all the 18 proteins required by the animal body, while no other single feeding stuff does this.

Dr. A. E. Jenks, of the National Research Council, has called my attention to Dr. Bird T. Baldwin's studies of the rate of growth of children (see Iowa University Child Welfare Studies). I have worked out the application of our formula to this case, using age as abscissas and heights as ordinates. Here again the rate of growth is excessive, especially during the first year, during most of which we may assume the children to be nursing, and the excess rate continues with diminishing intensity for about another year. When the constants of the formula are based on the heights from two to six years, the agreement between observed and calculated heights within these age limits is very close, the greatest difference being about one-third of one per cent of the observed height.

By differentiating equation (2) we obtain

$$dY/dx = k(M - Y). \quad (5)$$

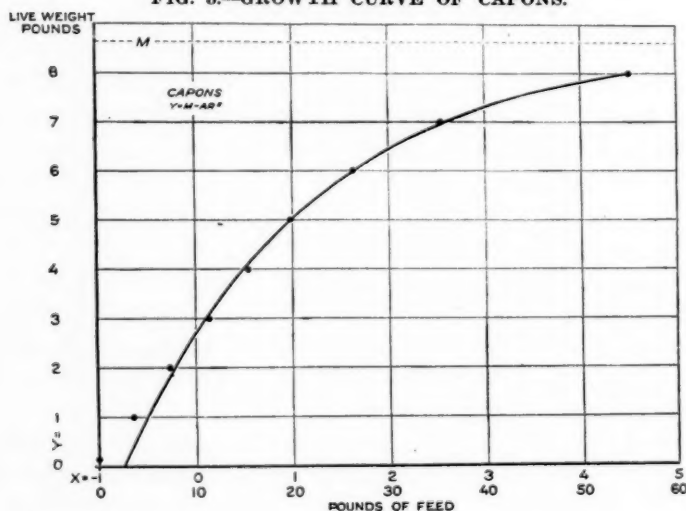
In this equation, dY/dx is the gain in weight per unit increase in x . The constant k is found from the equation

$$R = e^{-k},$$

in which e is the base of the Naperian system of logarithms. From this last equation it is easily shown that

$$k = -\log R / .4342945,$$

FIG. 5.—GROWTH CURVE OF CAPONS.



the number .4342945 being the modulus of the common system of logarithms. Since we know the value of M and R for each of the types of animals dealt with in the preceding discussion, we may, by utilizing equation (5) above, calculate the rate of gain of the animal corresponding to any liveweight, Y . The results for steers and pigs are shown in Fig. 3. Equation (5) is of the first degree; hence its graph is a straight line. The solid portions of the lines in Fig. 3 show rates of gain for those stages of the feeding during which the calculated gains are accurate (if we may assume that later gains followed the same law); the dotted portions merely show what the rates of gain

would have been in the early stages if the same law had held there. The rates are the same for the two classes of animals when the liveweights are about 400 lbs. Below this the pig has the higher rate; above, the calf gains more per hundred pounds of feed than does the pig. A generation ago it was common for cattle men to feed steers to a weight of 1,850, or thereabouts, at which weight steers make a gain of only about $4\frac{1}{2}$ lbs. per hundred feed units. It is not surprising that as agricultural science developed, feeding practice changed, so that now baby beef is favored by the feeder. The actual gains observed for weights within limits for which the values of the constants were determined are shown by the circles in Fig. 3.

The Corn-Hog Ratio

Assuming the correctness of our theory as to the rate of gain of hogs on feed, we can determine the most profitable weight to which to carry fattening hogs for greatest profit with given prices for corn and hogs. At present, data are lacking as to the relation of weight of hogs to sale price, so that what is said below must be considered only as a first approximation to the result desired.

Fig. 4 shows the relation between the corn-hog ratio and the most profitable weight to which to fatten hogs, assuming that the sale price is the same at all weights. The figure shows that when the corn-hog ratio is 8; that is, when 8 bu. of corn are equal in value to 100 lbs. liveweight of the hogs, the most profit (or the least loss) is obtained by selling the hogs at a weight of about 140 lbs. When the corn-hog ratio rises to 9, which means relatively cheaper corn, the most profitable weight is about 250 lbs. In this connection it is of interest to note that in the East, where corn is relatively high priced, and where the corn-hog ratio is consequently small, farmers who feed hogs ordinarily sell at a weight around 160 lbs.; in the heart of the Corn Belt the average weight is around 200 lbs.; in Nebraska and Kansas, where corn is cheaper, the average selling weight of fat hogs approximates 250 lbs.

Application to Capons

Some time ago a writer in one of the popular farm papers* gave the amount of feed required to produce a capon of various weights from 1 lb. to 8 lbs. In this case we are dealing with animals that did not get the benefit of milk during the early stages of growth. Their rate of growth during the early stages does not exceed that of the later stages. It is less, in fact, presumably because of the setback caused by the operation of caponizing. The data for capons are shown in Fig. 5.

If we may assume that the growth of the egg follows the same law as that of the birds after hatching, we may, by carrying our curve backward, calculate the amount of feed required to produce a two-ounce egg. This turns out to be .290 lb., which is at the rate of 2.32 lbs. of feed per pound of eggs.

At the Mississippi station (Miss. Bul. 204) Brown Leghorn hens are reported as laying 126 eggs a year and consuming 60 lbs. of feed; White Leghorns laid 157 eggs and consumed 69 lbs. of feed. The extra 31 eggs laid by the White Leghorns thus appear to have required 9 lbs. of grain, which is at exactly the rate of 290 lbs. per egg. If we deduct from the feed eaten the amount required for 126 eggs and 157 eggs, respectively, we find the maintenance ration of the hen for the year, which turns out to be 23.47 lbs. of feed.

Lady Cornell (Cornell Reading Course, Lesson 157, p. 376) laid 257 eggs in a year. These eggs weighed 29.5 lbs. At the rate of 2.32 lbs. of feed per pound of eggs these eggs would have required 68.44 lbs. of feed. The hen consumed the equivalent of 90.6 lbs. The difference, 22.16 lbs., represents her maintenance ration, which is in close agreement with the maintenance ration above arrived at for the Mississippi hens.

It would appear that the law of the diminishing increment offers a means of working out a number of problems in connection with the feeding of animals that are of more or less importance. It is hoped that this very brief presentation of the results thus far accomplished may arouse interest on the part of those in position to conduct research work on these problems.

*Country Gentleman, Jan. 22, 1921.

THE PLACE OF THE BEEF CATTLE FEEDING ENTERPRISE IN THE ORGANIZATION OF CORN BELT FARMS

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The place of beef cattle feeding in the organization of farms throughout a large part of the corn belt has stood the test of time. Any well established practice which is followed by a large number of farmers either is filling or has filled an economic place in the organization and operation of farms in the region. This has been determined by the experience and best information at the command of farmers who were responsible for the adoption of the practice.

A superficial study of the cost of feeding cattle shows that cattle feeders have scarcely broken even on the cattle feeding enterprise over a period of years. Undoubtedly a primary purpose of cost studies should be to establish the economic place of the practice in the farm business at the present time and especially to help meet the changing conditions. Apparently cost data on the beef cattle feeding enterprise studied separately from the farm as a whole does not adequately explain the economic importance of the enterprise in the farm business. In returning such data to farmers a careful analysis of the relation of the enterprise to the productive and financial organization of the entire farm unit is required to show the place the enterprise fills in corn belt agriculture.

It will be the purpose of this paper to use cost of production data in analyzing the place of the beef cattle feeding enterprise in the productive and financial organization of the entire farm unit in the Corn Belt.

The data used in this presentation were secured in the detailed cost accounting investigations conducted in Hancock County, Illinois, during the ten-year period of 1913 to 1922. The Department of Farm Organization and Management of the University of Illinois cooperated with eight to twelve men each year in securing detailed information on the cost of producing each product grown on the cooperating farms. A representative of the department visited each farm from two to four times each month to collect the daily

labor, feed, and cash records and to check these records with the cooperators, and careful crop production and inventory records were kept. All records were sent into the department each month for recording and analyzing.

Hancock County is located in West Central Illinois bordering on the Mississippi River in what is generally recognized to be a beef cattle and hog-producing section of the State. Hancock County farmers usually sell only about twenty-five per cent of the average annual production of 2,500 bushels of corn per farm. Much of the corn that is sold is fed by other farmers within the county. The section of the county in which the cost accounting investigations were conducted is a more representative beef cattle and hog-producing community than the county as a whole.

The usual practice in cattle feeding in this area is to purchase feeder cattle at some more western point and to put them directly into the feed lot. An occasional cooperator purchased stocker cattle or raised a few beef calves which were put into the feed lot. However this paper is limited to the analysis of the feed lot phase of the beef cattle enterprise in its relation to the organization of the farm unit.

Presentation of Data

The data secured on the cost of finishing 1,558 steers for market which were fed in 38 different lots during the ten-year period on typical farms in the area, may be presented briefly as follows:

	Average weight per steer	Average value per steer
Weight and cost when put on feed.....	894.2 lbs.	\$68.30
Weight and cost of gain.....	273.7	52.83
Marketing charges.....		2.87
Weight and cost of finished steer.....	1167.9	124.00
Net selling price.....		113.90
Deficit.....		10.10
Credit.....		12.17
Manure (75 cts. per ton).....		5.87
Pork (current price 1½ lbs. per bu. of corn fed).....		6.30
Net profit.....		2.07

Some cattle were fed on the cooperating farms each winter with the exception of 1920-21. It is probable that

the enterprise as a whole would have shown a loss had the feeders in this area fed the normal number of steers in that year.

That the financial returns of the cattle-feeding enterprises on which these data were secured were not unfavorably influenced by the date of marketing is indicated by a study of the average monthly receipts of cattle at Chicago throughout the ten years, the average price received for good fat cattle, and the distribution of the sales of the cattle upon which these data were secured.

A further study of the data on the cost of producing beef shows that the average feed lot cost of 100 pounds of gain was \$19.30; which was distributed to the different items of cost as follows:

Items of Cost:	Cost per 100 lbs.	Per cent of total
Feed -----	\$16.50	85.5
Man labor -----	.79	4.1
Horse labor -----	.35	1.8
General farm expenses -----	.56	2.9
Death risk -----	.13	.7
Buildings -----	.16	.8
Interest -----	.77	4.0
Miscellaneous -----	.04	.2
	<hr/>	<hr/>
	\$19.30	100

Relationship of Cattle Feeding Enterprise to the Organization of the Farm

The place and extent of the cattle feeding enterprise in the organization of the farm must be worked out primarily on the basis of the available feeds produced in the adopted rotation of crops.

An analysis of the separate items of expense entering into the cost of feeding beef steers shows that the cost of feed was by far the largest single item of expense. In the method of accounting employed the feed consumed by cattle was charged to the cattle at farm prices, for all salable feeds. However, values were placed on roughages which could not have been sold advantageously. It is not usually appreciated that a 4-year corn belt rotation of corn, corn, oats and clover with yields of approximately 50 bushel of corn, 45 bushel of oats and two ton of clover per acre, produces annually an average

of 1,760 pounds of grain and 3,062 pounds of roughage per acre, or a ratio of grain to roughage of 100 to 174.

Cattle feeding provides a method of marketing such roughage and at the same time permits returning to the soil a large part of the plant food materials removed in the crops. While a credit was assumed for the manure it was a conservative estimate. The final value of manure can best be determined in terms of long time increases in yields.

The cost of man labor in feeding steers amounts to a considerable charge in feeding a carload of cattle. In this area farmers frequently feed cattle without employing other than family labor. Winter labor created by such enterprises as the beef cattle feeding, which with a good cropping system provides all year employment for hired help serves as a means of retaining hired labor of a good grade on many farms. The Corn Belt farmer who does not have livestock usually has little productive winter labor. The labor kept on many Corn Belt farms can find time to feed a car load or more of cattle. Hence cattle feeding may be considered a means of marketing such labor to advantage.

The cost of horse labor in feeding cattle is to a large extent a gain from the standpoint of the farm as a whole. Frequently there is little labor for horses on farms of the Corn Belt during the winter months unless they are employed in caring for livestock. The cost of keeping horses on most Corn Belt farms is in the main a fixed expense which must be borne by all of the labor the horse performs. Hence the horse labor used by cattle may be looked upon as a reduction of the horse labor expense which must be borne by other enterprises or as a means of creating a market for horse labor at a fair rate per hour. In other words, little additional cost is added to the total cost of horse labor, but the rate per hour of horse labor on the other enterprises is lowered.

It should be noted, however, that if cattle were not fed a considerable part of the farm crops, some man and horse labor would be used in marketing the crops. This might be done on a particular farm during the winter season, but it would be accomplished mainly by exchange labor, which would have to be repaid at various times of the year. The fact that considerable exchange labor in marketing crops, especially

corn, is repaid during the growing season when farm labor should be most productive indicates that direct marketing of crops adds materially to the real farm labor costs. At any rate the direct marketing of crops does not fit the system of farming as effectively as cattle feeding.

The item of general farm expense as used in these data includes taxes; use of wagons and other vehicles; shop tools and minor equipment; cutting weeds; repair of fences; and similar costs which must be proportioned in some way to the productive farm enterprises. In the main these expenses will be realized whether cattle are fed or not. When the cattle feeding enterprise is introduced into the farm business and a portion of such expenses are charged to feeding cattle, the other productive enterprises are relieved of a like amount of expenses which tends to increase the profits on the other enterprises. However, the usual cost accounting procedure does not credit the cattle enterprise for such advantages resulting from the enterprise.

Most of the other items of expense charged to the cattle feeding are directly due to the cattle feeding enterprise.

Relation of Cattle Feeding to the Farm Business

In studying or planning the productive organization of a farm it is seen that there is necessarily a complex inter-relation of the separate farm enterprises which is not readily interpreted in a study of a single enterprise, but which has an important bearing on the final results of the farm business. The efficiency with which the farm unit is operated is dependent more largely upon the inter-relation of the separate productive enterprises than on the conduct of any single enterprise.

This fact can be demonstrated only through a careful analysis of the organization of the entire farm. The following analysis of an individual farm is offered as a method of analyzing the beef cattle feeding enterprise in its relation to the entire farm unit. The farm selected for this purpose is not in any sense considered an ideal one. It might well be observed nevertheless that the real test of a system of farming is whether anyone is carrying it out with a long time financial success.

The farm selected for this analysis is an all tillable farm on which records were secured for a continuous seven-year period. During this time the farm averaged 295 acres in size. From 40 to 79 cattle were fed annually, or a total of 395 cattle were fed out during the seven-year period. Practically all of the cattle were put on feed in October or November, with results as shown in Table I, and sold in March, April, or May. The cattle were fed an average of 156 days.

TABLE I
Cost of Feeding Steers
Average Results of a Seven Year Period from Average
of 395 Steers Fed on the Same Farm

	Average per Year	Average per Steer
Initial Weight of Cattle.....	58,116 lbs.	1,030 lbs.
Total Gain.....	14,280 lbs.	253 lbs.
Final Weight.....	72,396 lbs.	1,283 lbs.
Initial Cost of Steers.....	\$4,616.09	\$81.84
Operating Costs (in feed lot).....	3,251.17	57.64
Feed.....	2,812.11	49.86
Man Labor.....	146.06	2.59
Horse Labor.....	71.84	1.27
General Farm Expense.....	68.77	1.22
Buildings and Equipment.....	19.47	.35
Interest.....	107.19	1.90
Death Risk.....	11.05	.19
Miscellaneous.....	14.68	.26
Marketing Costs.....	170.66	3.02
Total Selling Cost of Cattle.....	8,037.92	142.50
Manure Credit.....	319.04	5.65
Pork Credit.....	481.65	8.54
Net Selling Cost of Cattle.....	7,237.23	128.31
Selling Price.....	7,527.86	133.47
Profit.....	290.63	5.16

This gives briefly the financial summary of the cattle feeding enterprise. Further analysis of the farm will be made showing the relation of the cattle feeding enterprise to the organization and operation of the entire farm, giving special reference to the feed fed the cattle and the farm production of feeds, the man and horse labor requirements, the other expenses charged to the enterprise, the relation of the enterprise to soil maintenance and crop yields, and the effect of the enterprise on the size of the farm business.

Utilization of Crops in Cattle Feeding

On the average of the seven-year period, \$2,812.11 worth of feed was consumed by feeding cattle representing \$2,464.48 for farm raised concentrates and purchased feeds, and \$347.63 for farm raised roughages. While much of the roughage had a sale value, yet a large part of this feed would have remained on the farm to be returned directly to the land if cattle had not been fed. The importance of farm raised roughages is better appreciated when shown in terms of weight in comparison to the farm produced grain. A total of 242,620 pounds of roughage and 172,072 pounds of grain was utilized by the cattle, or the ratio of roughage to grain was 140.9 to 100. The importance of this utilization of roughage on the farm is again emphasized when compared with the total farm production of crops which shows that the relation of roughage to concentrates produced on the farm was 151.8 to 100. It should be noted further that cattle and horses were the only classes of livestock on this farm that consumed a large proportion of roughage to grain. While the ratio of roughage to grain utilized by horses on this farm was 204.3 to 100 compared with the ratio of 140.9 to 100 for feeding cattle, the share of the farm raised roughage which can be utilized by work horses is limited by the number of horses which are kept to perform the farm work. On this farm approximately \$100 worth of roughage charged to cattle may well be considered to have had no sale value. While it might have commanded the sale value assigned to it, yet it was not a normal practice of the farm to sell such roughage from the farm.

Utilization of Man and Horse Labor

The average charge for man and horse labor spent on cattle was \$217.90, representing 767 hours of man labor and 911 hours of horse labor. This labor was expended in the period from October to May, inclusive. The effect of the cattle feeding enterprise on the distribution of man and horse labor on the entire farm is represented by Table II, which shows in each case that the labor requirements for feeder cattle come during the winter months on this farm and interfere but slightly with the peak load of labor requirements of the farm.

TABLE II

The amount of Man labor and Horse labor expended by months on the entire farm and on the Cattle Feeding Enterprise

	Man Labor		Horse Labor	
	For Cattle	For Total Farm	For Cattle	For Total Farm
January -----	160	511	202	495
February -----	144	496	178	428
March -----	132	718	179	1,121
April -----	79	916	77	1,792
May -----	31	1,000	30	1,828
June -----	---	1,133	---	1,632
July -----	---	1,370	---	1,316
August -----	---	889	---	1,024
September -----	1	934	---	1,137
October -----	13	815	7	1,274
November -----	78	825	91	1,471
December -----	129	648	147	913

On this farm family labor was available throughout the winter period to feed cattle, making it unnecessary to employ additional labor to carry on the cattle feeding enterprise. Relatively little work was available to employ the horses during this period of the year. If cattle had not been fed it is probable that little productive labor would have been accomplished in place of the labor spent on cattle, unless some other livestock had been introduced into the system of farming. The effect of cattle feeding was to increase the amount of productive labor on the farm and to create a market for both man and horse labor at fair labor rates.

In the cost accounting method employed, man labor rates were determined monthly and each enterprise received its share of the monthly man labor charges. Cattle feeding in providing a market for \$146.06 worth of man labor, required over 73 per cent of this labor during December, January, February, and March when there was no conflict with heavy labor demands for other productive work. In fact only 14 per cent of the man labor came at the time of the heavy spring demand for man labor. This might have been avoided by earlier marketing but the price trends indicate that the higher average market price of beef cattle in April and May justified the holding of the cattle, especially when cattle feeding required less than 6 per cent of the total labor expended on the farm during those months.

In the case of horse labor costs there is a still more distinct advantage in cattle feeding than in the use of man labor. A large part of the charge of \$71.84 for the 911 hours of horse labor expended was a clear gain resulting to the farm because of the cattle feeding operation. The method employed in determining the hourly horse labor rate was to determine the total horse costs for the year and divide by the total hours of horse labor employed during the year, giving a uniform hourly rate.

Cattle feeding required about 80 per cent of the horse labor used on the enterprise during the four months of December, January, February, and March or during the third of the year that required only 22 per cent of the total amount of horse labor employed throughout the year on this farm. The horse labor used for cattle was for feeding and bedding which added little to the cost of maintaining the horses. The total cost of \$71.84 for horse labor charged to cattle may be considered largely profit. The creating of 911 hours of horse labor may be looked upon largely as either an income due to marketing that amount of horse labor at a fair rate or a reduction of a like amount in the horse labor costs which would have been borne by the other productive farm enterprises if cattle feeding had not been included in the system of farming.

Other Expenses

The item of general farm expense amounted to a sum nearly equal to the cost of horse labor, or an average of \$68.77 per year. In the method of accounting employed the total general farm expense is distributed to the productive enterprises in proportion to the amount of man labor expended on the enterprise. General farm expenses by their nature are realized in large part regardless of what enterprises are included in the business and must be borne by the productive enterprises. Hence the charging of a portion of the general farm expenses to beef cattle tends to reduce the costs of other productive enterprises by practically a like amount.

The other items of expense charged to the feeding cattle on this farm including death risks, building expense, in-

terest, and miscellaneous expense represent actual expenses chargeable directly to the cattle-feeding enterprise.

Soil Maintenance

The maintenance or the improvement of the soil through livestock production is an advantage which would hardly have existed at a time when the soil retained its virgin productivity. However the present reduced productivity of land in most of the corn belt regions warrants careful attention. The relation of the cattle-feeding enterprise to the maintenance of crop production can be worked out in only a theoretical way at best. One method of showing the relation of the cattle-feeding enterprise to the maintenance of the soil is to determine the amount of feed which would have been sold from the farm if cattle had not been fed and use this as the basis to determine the amounts of the principal plant food elements which the feeding of these crops and of purchased feeds will return to the soil, when the manure is handled under farm conditions. According to reliable methods of determination, the feeding of cattle on this farm enabled returning to the soil annually a total of 2,030 pounds of nitrogen, 334 pounds of phosphorus, and 613 pounds of potassium. It is assumed in this estimate that only 40 per cent of the original plant food elements contained in the salable crops and purchased feeds fed to cattle would be returned to the soil under the conditions and practices found on this farm. It is further considered that the total production of unsalable crops would have been returned to the soil if cattle had not been fed. Theoretically, some of the plant food will be lost through feeding these unsalable crops but on the other hand soil authorities say that the effect of farm manure on the bacteria and organic matter content of the soil has an additional value upon which it is impossible to place a money estimate, and that this gain may be considered to offset the value of plant food elements lost through feeding the unsalable crops to cattle. On the basis of valuing nitrogen at 12 cents a pound, phosphorus at 10 cents and potassium at 6 cents a pound the added value of the plant food returned to the soil because of the cattle-feeding enterprise carried on to the extent indicated on this farm would be \$313.75 more than if the crops had been marketed.

The Effect of Cattle Feeding on the Size of the Farm Business

The increase in the farm income due to the cattle feeding enterprise is in reality a cumulative income resulting from the inter-relation of this enterprise with the other farm enterprises which is not shown in a study of the cattle feeding enterprise when analyzed apart from the rest of the farm business. Taking this particular farm as the example it has been shown that the cattle feeding enterprise utilized feeds advantageously, it provided profitable employment for available man and horse labor at a season when the labor was not needed for other productive enterprises, it bore a share of the overhead expenses which would otherwise have been borne by the other productive farm enterprises, and it returned a considerable part of the plant food elements contained in salable and purchased feeds to the soil. One means of measuring the value of these cumulative advantages attributed to the cattle feeding enterprise is to show the financial statement of the entire farm business in contrast with the same statement with the cattle feeding enterprise removed; which can be done fairly accurately for a given farm on which detailed cost information is available.

TABLE III

Farm Income With and Without Cattle Feeding.
Average of Seven Year Period on the Same Farm.

	Farm Income With Cattle	Farm Income Without Cattle
Receipts and Net Increases.....	\$19,457.02	\$13,909.00
Crops	5,986.76	8,466.96
Feeding Cattle.....	7,546.57	-----
Pork Credited to Cattle.....	481.65	-----
Sale of other Livestock.....	5,319.43	5,319.43
Miscellaneous	122.61	122.61
Cash Expenses and Depreciation...	8,121.76	3,186.55
Grain, Feed and Seed Bo't.....	971.51	639.11
Livestock other than Feeders...	694.24	694.24
Feeding Cattle.....	4,627.14	-----
Threshing, Baling, etc.....	288.80	347.28
Cash Labor Hired.....	420.77	420.77
Upkeep and Depreciation.....	471.18	451.71
Taxes and Miscellaneous.....	648.12	633.44
Net Income.....	11,335.26	10,722.45
Interest on Investment.....	2,354.36	2,250.16
Family Income.....	8,980.90	8,472.29
Increase in Family Income.....	508.61	-----
Value of Added Fertility.....	313.78	-----
Total Credit due Feeding Cattle...	822.39	-----

In removing the record of the cattle feeding enterprise from the farm account, as shown in Table III, the receipts were reduced by the selling value of the cattle and the value of pork produced and accredited to cattle, while the sale of crops was increased by the quantity of the salable crops fed to feeding cattle, but figured at the local market price. The farm expenses were lessened by the initial cost of feeding cattle, the value of feed purchased and fed to cattle, the annual cost of equipment chargeable to cattle, the interest on the added investment due to the cattle feeding enterprise, and the share of other expenses which could be charged to the cattle feeding enterprise.

This comparison shows that the cattle feeding enterprise added \$508.61 to the family income. The additional credit of \$313.78 for the value of plant food returned to the soil as a result of cattle feeding gives a total credit to the cattle feeding enterprise of \$822.39 from the standpoint of the farm as a whole whereas the cost figures of the enterprise analyzed separately from the farm business gave the enterprise a profit of only \$290.63. Furthermore, it may be questioned whether the cumulative effects of cattle feeding should not measure fertility values in terms of increased crop yields rather than merely to value the plant food returned to the soil. On this farm this is impossible due to the fact that cattle feeding has been a regular practice for over 20 years and definite crop records are not available for all years over so long a period of time. However, the statement of the owner of this farm who began operating the farm 45 years ago was that crop yields had been increased from 15 to 25 per cent as a result of feeding cattle.

"Twenty-five years ago it was noted on this farm that the soil was becoming impoverished. The physical conditions of the soil and the crop yields were becoming worse year by year. The 4-year rotation followed of corn, corn, oats and clover, gave maximum yields of 60 bushels of corn and 50 bushels of oats per acre. After the feeding of cattle was well started, the maximum yields with the same rotation were 90 bushels of corn and 90 bushels of oats. More recently wheat, rye, and soybeans have been introduced taking the place of oats in part and good yields of these crops have been secured."

"The owner of the above mentioned farm looks back upon the years spent in buying and feeding cattle as the best years of his life, that is, from the standpoint of effective use of labor and in satisfying the love of gain."

In conclusion it would seem that a study of this kind should help provide the background of information needed if the most intelligent effort is made to secure the best organization of farms in the cattle feeding sections of the country. Other productive enterprises might lend themselves to a similar analysis, however hardly any other phase of farm production possesses the same complementary relationship to other productive enterprises. The beef cattle enterprise is favored by the facts that crop enterprises compete for labor at the season of the year when labor is in greatest demand, and that other livestock enterprises except the feeding of sheep are subject to all year labor demands and they consume a larger proportion of readily salable grain crops.

Furthermore, the cattle feeding enterprise which does not directly require much land area, can be added to the farm business in a surplus corn producing area without displacing some other enterprise either wholly or in part.

This analysis and the testimony of the owner of the farm discussed help to substantiate the thought of many cattle feeders, which was expressed by a financially successful cattle feeder and land owner, in the statement that he never made any money as a direct result of cattle feeding but that he never made any money farming until he began to feed cattle.

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EFFICIENT FARM ORGANIZATION FOR LIVESTOCK PRODUCTION IN THE SOUTH-EASTERN STATES

JOHN R. FAIN

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In developing an organization for livestock production, it is necessary to evolve a system to meet all the conditions brought about by the environment or by the economic situation. This at once establishes the fact that the farm organization cannot be hard-and-fast, but even within a limited area, will have to be exceedingly elastic. Consequently, an exact knowledge of conditions, not generally available, is required. It is true, that such knowledge has been gained by many farmers through experience, but it is generally of value only to themselves. However, if a permanent business is to be established, this knowledge must be utilized.

It is desirable that the farm organization for livestock production should take into consideration a cash crop. As this crop would be variable, even in the limited area under discussion, the organization would vary somewhat. The general rule should be that the cash crop should contribute something to the livestock production; as, for example, the straw from small grain for either feed or bedding, or, cottonseed meal for feed, in the case of the cotton crop.

One of the profits usually attributed to the livestock business is that coming from the manure. An advantage of having a cash crop connected with the livestock business is that the manure can be cashed through this crop and some estimate can be made of its value. As a matter of raising the crop producing power of the farm, no better place can be found than on a leguminous green manure crop.

The area under consideration is exceedingly variable. The soils range from the sands and sandy loams of the Coastal Plain region to the rather heavy clays of the limestone sections. This variation in itself will change the organization, since it is not conceivable that the same methods could be used in the blue-grass sections of the limestone region and in the Coastal Plain. In elevation the variation is from sea level to 4,000 feet or more. The topography ranges from level plains to rugged mountains. The natural growth varies with these different conditions. The general type is that afforded by

andropogons, which are fairly nutritious in the early spring, but soon become harsh. The exceptions are the blue-grass in the limestone sections and the Japanese clover over a considerable part of the remainder of the area. These plants come in naturally and furnish a great bulk of the grazing for the area.

As feed, particularly cheap feed, is the largest factor in livestock production, the organization will be built up mainly around the production of feed. The next consideration is whether the handling of livestock is to be a matter of marketing crops at a reasonable farm value, or whether a profit over and above feed values is to be made out of the transaction. While the latter is the desirable objective, a good part of the handling of livestock meets only the first condition.

Pasturage is the cheapest feed available. Therefore, a great deal will depend on the pastures. This brings up several problems, particularly, what is to be the future of pastures? Will they disappear with the increased price of land, or can their efficiency be built up to such a degree that they can always be maintained to advantage? Here is a problem which seems not to have been touched; neither has the relationship of the pasture to the farm as a whole, including its influence on fertility, been worked out. Another phase of the pasture problem is brought about by the fact that only a few plants are adapted to the whole region. The southern line of Tennessee and North Carolina, westward from the Coastal Plain, fairly divides the area of temperate zone plants and semi-tropical to tropical plants. In a large part of the section we are considering, the urgent problem just now is whether reforestation or pasturage is the better method of utilizing the land. In many cases, reforestation and pasturage can be combined. The best utilization of the available native growth is a problem presenting many difficulties.

Looking forward to becoming fairly permanent, any livestock development in the Coastal Plain region, or, at least a large part of it, must be predicated on twelve months' grazing, but the twelve months' grazing we have at present does not produce the type of animal to meet the market requirements. For some time, nine or ten months on permanent pastures and two or three months in the velvet bean fields may be the best available combination.

Just how far north grazing for twelve months will be feasible, it is difficult to say. Some work in recent years in Western North Carolina seems to indicate a rather wide application of twelve months' grazing, provided the details can be worked out to meet local conditions.

There is a decided tendency to develop the livestock business based, to a considerable extent, on the harvesting of the crop by the animals. Here again, all of the factors will have to be taken into account. No particular damage seems to be done by grazing the land in the winter, when it is frozen, or by grazing the land in the Coastal Plain region under any conditions. Between these two conditions, we have rather heavy land and fairly heavy rainfall, with little freezing, or if any freezing, usually at night with a thaw in the day.

In producing grain for livestock on the more fertile areas, corn, oats, and barley will be, as they are in other sections, the chief grains. Unfortunately, these grains are not profitable on a large percentage of the area under consideration. Outside the area that can grow these grains to advantage, the dependence will have to be placed on leguminous grain. In several sections, we find that the livestock industry is based on such grain. That many things are yet to be learned about handling animals and crops to obtain the maximum results is true, but there is little doubt that the livestock business will continue to be based to a large extent on the use of these grains.

The tendency of the section is to produce relatively more leaf and stalk than grain. The greatest advantage to be taken of this tendency will be through silage. To begin with, by-products, such as Bagasse from sorghum and sugar cane, will be utilized. Corn stalks, after the corn has been removed, is now a common source of silage. A combination of saccharine choos from. The outstanding one is undoubtedly the soy nage and quality, when silage is the first consideration.

The great need of the section is a perennial hay. Alfalfa will meet this need under many conditions; under others, such as the Coastal Plain, it is not practicable. Therefore, for some time to come, dependence will have to be placed on annual hay crops. Fortunately, there is a variety of plants to choose from. The outstanding one is undoubtedly the soy bean.

Parasites are always a problem in livestock production. The control of parasites and the working out of the needed sanitation will have to be a part of the farm organization. It has been suggested that parasites are an unsurmountable obstacle in the way of livestock production in the Coastal Plain region. This assumption does not seem to be borne out by either the investigation of present conditions or by the present development of the livestock industry in this region.

Another big problem is to select the kind and breed of livestock to meet the conditions. For instance, a great deal has been said about the grazing qualities of the Herefords, yet in the Coastal Plain, the Angus seem to be in the lead. Recently the speaker attempted to get some information about the returns per acre from a number of breeds of sheep on pasturage of different qualities. Such information does not seem to be available. A ranchman in Florida has raised the question as to how high a grade animal can be utilized on the ranges. His conclusion is that a quarter-blood animal is as high a grade animal as can be expected to live under range conditions in that State. However, the best of the native cattle certainly should be used as the base on which to build for either the beef business or the dairy business.

It will be necessary, also, to determine whether the product in beef cattle is to be turned off as calves, stock cattle, or finished cattle, either mature or baby beeves. Probably all will be used to meet the varying conditions. An outstanding factor seems to be that pasture and forage will have to be utilized to the fullest extent.

The housing problem for the section is not great, since nothing more than shelter to break the wind and to keep off the rain is needed. The evidence seems to justify the conclusion that, if animals are given sufficient feed and some shelter to protect them from the most inclement weather, they do better in the open than when housed.

With the opportunities for securing credit, provision seems to have been made for financing the livestock business. The big problem now confronting the investor is, what will be the value at the time of marketing? If a system can be worked out to help to forecast the general trend, it will do a great deal to assist the man who is trying to develop and maintain a livestock business.

INTERNATIONAL AGRICULTURAL PROBLEMS*

DR. ERNEST LAUR

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While individualism is native to the farmer, more especially the peasant cultivating a small isolated farm who has to rely on himself for most things, nevertheless circumstances have compelled agriculturists to seek support by coordinating their efforts. This has been more especially the case in mountain regions where utilization of pasture lands and forests and the struggle against the elements soon compelled the habitants to concerted action; but in the villages of the plains manorial jurisdiction, compulsory rotation of crops, and the system whereby the land lies fallow every third year created as far back as in the Middle Age, mutual ties between the inhabitants of the villages, which have often been compared to real rural associations.

Nevertheless, for long centuries the mutual relations of farmers were of a purely local description and the peasant was opposed to all notions of extending them. When any bold pioneer attempted to induce the peasants to collective action, he met with defeat and his followers often paid with their lives and property for their daring, so that all attempts in this direction were short lived.

It is therefore not surprising that in the 18th Century the membership of agricultural associations consisted exclusively of friends of agriculture, statesmen, directors, State officials and large land owners. Ordinary farmers were an infinitesimal minority in such associations.

But all this has changed in the 19th Century. The rapid development of means of communication upset former notions on economics. The pressure of circumstances swept away old prejudices and the individualistic farmer soon realized that his only chance of salvation was to be found in collective action. This gave rise to cooperative movements of a nature formerly unknown.

*It is with pleasure that the Editor presents to the readers of the Journal an English translation of an article on the International Agricultural Problems by Dr. Ernest Laur. The article was brought to our attention by Prof. Asher Hobson, Representative of the U. S. to the International Institute of Agriculture at Rome. Although the article is written from a point of view somewhat foreign to the American readers of the Journal it contains many interesting suggestions. European farmers have many problems in common with American farmers.

In Switzerland, which has an agricultural population of about 1,000,000 people there were 11,000 local agricultural associations in 1920 with in round figures 657,000 affiliations. We use the word "affiliations" and not members as a great many peasants are members of several associations at the same time which explains how it is that the number of these "affiliations" considerably exceeds the number of independent farmers. Many of these local organizations are in their turn united in cantonal and national associations and finally the whole lot are grouped under the protection of the Swiss Peasants Union, the exponent of the economic interests of the agricultural population.

Such agricultural associations are not an exclusively Swiss development. A similar evolution has occurred in other countries, more especially in Germany. France and Italy also have a large number of agricultural organizations.

For a long while agricultural associations did not extend beyond the frontiers of the respective countries. For several years past, agricultural associations have indeed opened up contacts, but limited almost entirely to questions of a technical nature.

One of the oldest of agricultural international organizations is the International Agricultural Congresses. It is a semi-official body. At first, agricultural associations had no direct representation thereon but the Commission consisted of a certain number of persons selected by the Congress for each country from those who had taken part in its labors as representative of their respective governments. Later, however, the participation of agricultural associations therein has been accentuated.

The International Commission of Agriculture was presided over by Jules Meline, former Minister of Agriculture, and owes its success primarily to his high standing. A similar organization has been formed for the dairy industry, but government influence is not so strong in that body as in the International Commission of Agriculture.

On his side, private Counselor Haass started grouping the federations of agricultural syndicates and brought together those of Germany, Austria, Hungary, Italy, Switzerland, the Balkan States and at first France. This association dissolved before the War.

At the time when the International Agricultural Congress held its meeting at Lausanne, Professor Ruhland developed a detailed plan for regulating the price of cereals. His proposal gave rise to the International Commission for the Sale of Wheat, the purpose of which was to regulate the price of cereals by publishing market lists and restricting the area under cultivation. This Commission never acquired practical importance but its experiences clearly showed the difficulties in the way of solving problems of that kind.

It would seem that a similar line of thought was at the basis of the proposal made to the King of Italy by David Lubin, an American merchant and farmer, when he proposed to found an international institute of agriculture mainly for the purpose of publishing market price lists and statistical data concerning cereal crops. This institute was subsequently founded with a much broader program than originally contemplated. Over 50 governments are now members thereof.

The idea of grouping agricultural organizations into an international association assumed new vitality after the war. There was even talk of forming a Green International. An international confederation of agricultural syndicates was founded at Paris to which several associations adhered. But as only one organization from each country may be affiliated thereto, its development has been hampered. Its constitution would lend itself to the solution of the international aspects of the problems which agricultural syndicates are brought up against.

The Austro-Hungarian Succession States took the initiative in forming a Germanic Peasant's League which has already organized several congresses, but, as its name indicates, it is sectional in character.

Quite recently, wine exporting countries have established international contacts and held a congress. They propose to organize an international bureau for wines. At the last international agricultural congress held at Paris, wheat seed-breeders also proposed to found an international organization. The representatives of agrolological science have also established international connections which have gradually assumed a more clearly defined character.

We thus see that if agricultural circles of the most varied description are attaching more and more importance to secur-

ing international connections, it is because they recognize that many of the problems they have to face are no longer limited by the boundaries of their own nations but are of equal interest to farmers of several countries. It is not only impossible for an isolated farmer to settle them for himself but governments are equally unable to do so. There are numbers of questions on which it would be advantageous to the farmers of several nations to take common action which would at least enable them to prepare valuable proposals toward their solution. We will outline in the following pages the importance of collaboration between farmers of the several countries toward the solution of some of the economic problems now facing them.

Land Tenure

It has been truly said that "the soil is the country," and indeed it would seem that the problems affecting land and land tenure are not subject to international influences. Nevertheless, since the war, there has been an evolution of thought in this field and the question of land tenure has lost its local character and assumed the aspect of an international problem. While it is quite true that land holdings are circumscribed within the frontiers of the several countries, nevertheless international organizations have taken up the question of the ownership and distribution of farm lands. In certain circles the suppression of private property in land is advocated. In others the division of the largest estates and the creation of small peasant holdings is advocated as desirable.

The experiments made in Russia have shown here that farming by government on large tracts yields very inferior results when compared even to the small holdings worked on very primitive lines such as existed before. As to the division of large estates into small peasant holdings, we must admit that the first effects seem to have been more harmful than otherwise.

The question of the division of large estates has arisen in many countries besides Russia. More especially in Germany it is one of the leading problems of home policy.

The partisans of large estates refer to war experience and assert that during that critical period the cities could not have been fed but for the existence of large estates. They fail,

however, to take into account that during the war the peasant holdings carried on a large clandestine traffic in foodstuffs; however, the results of experiences made abroad are distinctly opposed to the conclusions which the Swiss Peasant Secretariat is entitled to draw from its inquiries into the revenue derived from farms, inquiries which it has been carrying on for more than 20 years with the assistance of several hundreds of farmers from all parts of the country.

A careful examination of the books of Swiss farmers and land owners who send in detailed accounts of their business to the Peasant Secretariat shows that the gross product and income of a farm, increase in inverse ratio to its size. Unlike what might have been expected at first sight, the total of products sold—deducting those consumed by the farmer and his family—is considerably higher per hectare on small farms than on large.

The following figures which show the averages from 1901 to 1921 prove this:

	Gross product per hectare.	Value of products sent to market per hectare.
Farms from 3 to 5 hect.	1,180 fr.	795 fr.
“ “ 5 “ 10 “	1,005 “	740 “
“ “ 10 “ 15 “	900 “	700 “
“ “ 15 “ 30 “	825 “	660 “
“ “ 30 hect. and over	710 “	595 “

The apparent contradiction between the results of the inquiries of the Peasant Secretariat and experiences gained in certain foreign countries is easily explained. If peasant farming is to give better results than farming on large estates, it is essential that scientific methods should be used, that the head of the farm should have a sound professional training, and that small tillers of the soil, as a result of organization and cooperation, should be able to avail themselves of advantages, which would otherwise be the privilege of large estates.

Wherever these conditions have been realized, the gradual change from the regime of large estates to that of small farms cannot fail to bring about a substantial improvement in the nation's economic status. But this evolution can only take place gradually, as a nation trains capable farmers, and is in a position to place the capital they require and other essential institutions within their reach.

Whenever these preliminary conditions have not been complied with, the sudden change from a regime of large estates to that of small farms tends to reduce considerably agricultural production.

As the Socialist and Communist movement is essentially international in character, agricultural circles cannot afford to remain inactive but must seek to act on public opinion by opposing the errors of Marxism by the great principles which should guide international agricultural policy and which we believe are the following:

a) It is not practical for the government to undertake farming operations on a large scale. Any such action would lead to marked curtailment of production and increased costliness. It would endanger the food supplies of the non-agricultural population.

b) It is in the interest of national economy to increase the number of individual farmers.

c) Nevertheless, the transition from a regime of large estates to that of small farms, must be carried out with great prudence, more especially where conditions are unfavorable to the introduction of intensive methods of farming and where the general and professional education of the peasantry is primitive and lacks solid foundation. It is essential that the representatives and friends of Agriculture should continue to proclaim these principles in all civilized countries so as to fight the uncertainties in public opinions of such matters brought about by dangerous dilettantism.

Agricultural Labor

The Versailles treaty reserved a great surprise to agriculture. As a reward for loyalty during the war, this treaty promised the workmen an eight-hour day and provided for the establishment of the International Labor Bureau at Geneva to watch over the realization of this promise. Agricultural circles, which believed, in common with others, that the question of the eight hours a day was a purely industrial one, made no objections to this proposal. What was not their surprise when the Labor Bureau declared that it was competent, not only to regulate hours of labor in industry, but also in agriculture!

Agricultural circles vainly insisted on the fact that the Versailles treaty only deals with "industry." The Labor Bureau maintained that in the English and French languages the word "industry" covers agriculture also.

This point of view, however, disregards the fact that the article of the treaty, in regulating the organization of the General Conference, made no provision for the representation of agriculture, each country being represented only by two government delegates, and by one delegate for the employers and one for the workers organizations.

As the place reserved to employers was held by representatives of the manufacturing classes, agriculture is unrepresented at the general conferences.

On the other hand, Art. 393, which outlines the formation of the Board of Administration of the Labor Bureau, states that of the 12 delegates representing governments, 8 shall be appointed by those countries whose industrial importance is greatest. All those who know the manner in which the Board of Administration has been formed, can clearly see that no effort of any kind has been made to interpret this notion of industrial importance as referring also to agricultural activities. Had there been the least intention of extending to agriculture the activities of the Labor Bureau, there is no doubt that when its articles of association were drawn up an equitable representation would have been granted to agriculture at the General Conferences. The collaboration of agriculture through technical advisors or alternative members is entirely inadequate. Thus the Board which has to decide all questions referring to agriculture is a body on which those interests are hardly represented at all.

During the war, it was the peasant and his sons who bore the brunt of the struggle while the industrial workers for the most part continued in the factories earning large wages. Yet these latter are gratified with the 8-hour day while the peasants are injured by vexatious measures which they object to as entirely inapplicable to agricultural conditions.

Unfortunately, the International Court at the Hague, to which the competency of the Labor Bureau on agricultural matters was referred, saw fit to uphold its point of view. The International Institute of Agriculture in Rome after the decision of the International Court decided to collaborate with

the Labor Bureau through a Joint Commission consisting of members of both institutions charged to study all questions brought up for action. The keen opposition of agricultural circles to all international agreements for regulating hours and conditions of agricultural labor is as active as ever and should such a convention be drawn up it is certain that they will only be ratified by a small minority of countries. Nevertheless, the efforts to which we have referred show that the question of agricultural labor has become an international problem which agricultural associations cannot afford to ignore.

Now there is no doubt that the position of the farmers would be infinitely stronger if they possessed an international organization which would allow them to manifest their collective opinion on the subject.

Any agreement with reference to agricultural labor undoubtedly will be rejected in Switzerland, but the situation is not the same in all countries. If those countries where extensive agriculture is the rule and where the number of agricultural labors is comparatively high, agreed to make a notable reduction in the hours of labor, there is no doubt that this would lead to a great rise in the cost of agricultural products.

The small farmer would often benefit by this state of things for he would secure higher prices for his products. It is therefore the consumer rather than the peasant who would suffer from this change and it is less from the narrow standpoint of direct class interest than from the broad standpoint of national economy that all exaggerated attempts to regulate the conditions of agricultural labor are to be feared.

Raw Materials Required by the Farmer

The war has clearly shown that at critical periods those nations which do not possess raw materials are in an inferior position to others. Since the war, governments have brought into use another weapon in economic warfare, export restrictions and prohibitions. Only experience will be able to show how far it will be possible to combat this new system by means of international contacts. I think that the best means of preservation against export restrictions and prohibitions is an effort to increase world production which will make them

fall of themselves. On the other hand, it does not seem probable that international agricultural organizations can do much in this field, for their interests are too diverse. For instance, during the War it was the farmer who called for restrictions on the export of fertilizers and forage and it must be admitted that in this field self-interest will always prevail over the counsels dictated by a broad realization of international relations. We believe that the only useful result that can be hoped for from the collaboration of farmers of all countries in this field is the publication of international statistics of production, commerce, trade, and prices of all raw materials. This work has already been undertaken by the International Institute of Agriculture in Rome which has done much work of great value in this field.

On the other hand proposals have been made for creating international federations of agricultural cooperative societies for purchasing and determining the price of the raw materials needed for agricultural production. It has even been suggested that these Federations might undertake the collective working of mines, the manufacture of fertilizers and oils, and other similar tasks. At the start collaboration in this direction would necessarily have to be strictly limited, the associations of the several countries would try to inform themselves mutually of conditions, they would cooperate occasionally to facilitate each other in the purchase of such raw materials. Nevertheless we think that the idea of running certain undertakings in common rather than forming share companies for that purpose is deserving of consideration.

It will also be well to study the question of transportation. It has often been noted that certain international transport services are inclined to a policy of obstruction towards co-operative undertakings. Their shipments are held up and preference given to those coming from other customers, and in many little ways competitive business firms are favored. Should such action be generalized cooperative associations would have to consider the need of organizing cooperative shipping concerns to watch over the dispatch of their shipments from the great trading ports.

Undoubtedly the problems we have outlined have not yet reached that degree of development which would allow of their being settled now. But our study would be incomplete if we

had not referred to them so as to indicate what degree of development they might attain if international relations were established in the agricultural field.

Progress in the Technical and Scientific Field

Trade secrets are practically unknown in agriculture. Farmers never even dream of patenting the results of their experiments and research work. Far from it, the agricultural press and agricultural organizations try to give them all the publicity they can so that all may take advantage of them. One of the principal tasks of the International Institute of Agriculture in Rome is to enquire into progress secured in the technical, scientific, and legislative field and to make such progress known to the farmers of all civilized countries. With this end in view it publishes two bulletins besides monographs on special questions.

One of the most important matters for agriculture is the control of insect pests and plant diseases. Parasites of all kinds which attack plant life do so regardless of frontiers. They can therefore only be effectively controlled by parallel measures taken in the several countries affected. Thanks to the assistance given by the International Institute of Agriculture an international convention was drawn up dealing with efforts to control the introduction and spread of plant parasites and diseases. This convention which is modelled on that against the phyloxera, makes it compulsory on governments to take measures for protecting cultivated plants. The importance of living plants is only to be allowed when they are accompanied by a certificate specifying that they come from a district free from certain parasites; legislation is to specify the plant enemies against whose spread it seeks to protect the country. Unfortunately only a small number of governments have so far ratified this convention, not even Switzerland has done so yet.

For long time past efforts have been made through international congresses and agricultural expositions to enable technical progress to cross national frontiers. It would be highly desirable that these congresses and expositions should be reorganized on a really international basis and that in the

technical and scientific sphere nations should renew the close international relations which existed before the war.

The Price of Agricultural Staples

Price regulation is the leading question claiming the attention of agricultural circles in the international field. The price of most staples depends on the world market, and is more or less subject to international influences. Therefore, to obtain an approximate idea of future price movements, it is essential to have an international information service. The International Institute of Agriculture in Rome already performs a valuable service in this field, more especially with reference to the grain market. It collects and publishes data of the greatest interest on cultivated areas, harvest yields, trade, storage, means and cost of carriage and prices of cereals. But the International Institute of Agriculture makes use almost exclusively of official reports in drawing up its statistics, and on the other hand it does not try to forecast future price fluctuations; consequently it fails to fulfill the task of most practical importance to the farmer. The very real value of the work of the International Institute of Agriculture will grow in that degree in which it strives not only to draw up detailed statistics on past conditions, but to forecast the future trend.

The Swiss Peasants Union has organized an international information service on prices for milk and dairy products. It publishes its quarterly report on the market situation for milk and dairy products.

Unlike the Rome Institute, it does not only determine conditions of the market in the past, but tries to forecast, with the help of the data it collects for the past and present, what the future is likely to be. In this way, the quarterly bulletins of the price information office of the Swiss Peasants' Union not only inform on the progress of the markets, but also influence to some extent the development of business.

It is easy to understand that official institutions are not anxious to extend their activities in the price field. This form of activity is necessarily reserved to private organizations. In this field the interests of the farmers of the whole world are similar. This rule is only subject to exceptions in certain special cases, as, for instance, in the case of forage corn and

forage barley, of which great quantities are exported to meet the agricultural needs of other countries. These exceptions do not affect the fact that through international relations farmers could succeed in exercising a much more effective control on the market and in regulating prices when such action is felt to be necessary.

One of the reasons which give renewed vitality to the question of international organization dealing with price fluctuations is the fact that the World War and subsequent events have rendered the agricultural situation much more critical.

Undoubtedly, towards the end and immediately after the War, there was a period of unexpected prosperity for the farmer, but it was of short duration and was closely followed by a period of deep depression. The present situation is such that farmers in all countries receive a much smaller proportion of the national revenue than was the case before the War. The price of farm staples has fallen heavily, much more so than the wages of the workmen, the salaries of employees, or the profits of the traders.

If the prices paid the farmer for his products are still higher than before the War, the increase is much less than that in the expenses of all kinds which the farm has to meet. It is therefore entirely insufficient. The only means of putting a stop to the present situation which has become quite unbearable, is for the farmers of the different countries to unite to seek a remedy. The duties which such an international organization would have to perform would be substantially as follows:

- (a) Study closely the market situation,
- (b) Determine the lines for future price movements.
- (c) Endeavor to regulate production in accordance with demand and the market situation.

This will be done at first by means of general recommendations, but perhaps some day it will be possible to take executive measures. It is evident that the solution of these problems will encounter many difficulties. Nevertheless, even if it is wise not to build up illusions as to the possibility of finding satisfactory solutions, it is worth while to make an effort in that direction.

Care should be taken not to build up organizations on too large a scale, nor to attempt to go too far at first; on the other

hand, in order that the organizations formed for this purpose may be of use, it is necessary that each should deal with one special product to the exclusion of all others.

Thus, one international organization would specialize in the market for milk and dairy products, another in that for wine, a third for cotton, a fourth for hog products, others with grain, livestock, butcher's meat, etc.

The author of these pages drew up for the International Dairy Congress at Washington, a draft international organization for the utilization of milk. Events will show if his suggestions are practicable.

Limitations of Interest Rates

Undoubtedly, the question of interest rates is an international problem. Whenever a government draws up measures limiting interest rates, it is told that a country which finds itself isolated in this field, is reduced to impotency. But this statement is somewhat exaggerated. It is possible for a country, more especially for a big country, to secure some results by legislating on interest rates. It has even been proved in Switzerland that measures taken by the Cantons yielded some results. Nor should one forget that conditions vary greatly from one country to another and that in a country which exports capitals the maximum rate of interest will never be as high as in a country which is developing and whose legal and economic status is not yet stable.

Anyhow, it is interesting to note that the question of establishing an international agricultural bank is one of those which has claimed the attention of international agricultural associations. Undoubtedly, the time for carrying out this proposal has not yet come. But it would not be impossible for existing national federations of mutual loan banks to enter into relations and proceed to the international regulation of their financial operations. Perhaps a movement of this kind will facilitate later on the formation of a permanent institution.

Moreover, it seems essential that no country should cease to study the question of limiting interest's rates. The workers succeeded in realizing their claim for an eight-hour day by constant, untiring, propaganda. Similar means will secure the satisfactory solution of the problem of a maximum interest

rate. Undoubtedly, the existence of a certain rate of interest is indispensable under our present economic system. But this rate should not exceed a certain figure. It should act as a stimulus, promoting savings and initiative, but under no circumstances should it be a means by which the lender can exploit the borrower. We will leave to the future the task of deciding whether some day international agreements may be arrived at fixing the maximum rate of interest.

Official International Relations

Now that governments are beginning to regulate by international treaties various problems directly affecting agriculture, it is essential that the farmers of the several countries should come to an understanding as to their attitude on these questions. Evidently, we do not refer here to treaties between two or three governments such as treaties of commerce, but to those which interest a whole series of countries, in order to establish the desired contact between agricultural circles on questions which are of interest only to two countries, it is not necessary to form a special organization. All that is necessary is that the authorized spokesmen of the farmers of the two countries should meet whenever a treaty is to be drafted. The situation, however, is different when a treaty of a general character is under consideration. To this category belong conventions, dealing with the control of plant parasites and diseases of animals, pure food legislation, the protection of trade marks, designations of origin, the description of chemical fertilizers and concentrated cattle feeds, the effort to control adulterations of all kinds. Other such general questions are those of the financial support to be given to the International Institute of Agriculture, the collaboration of the different countries in the work of that Institute, the representation of agricultural interests in the International Labor Bureau, and all questions connected with the work of the League of Nations. As countries are increasingly resorting to treaties as a means of regulating their mutual relations, as the influences of the League of Nations on the legislation of the several countries increase, so it will become essential that questions of this kind should be thoroughly studied in congresses or by means of international organizations.

The above statement shows the need of forming international agricultural organizations and the importance of the task before them. It would be desirable that the many efforts made in this direction should no longer be undertaken in a hap-hazard fashion, but should be coordinated in accordance with a commonly recognized purpose.

We believe we have said enough to indicate that the efforts made to allow farmers to cooperate in the international sphere should be inspired by an effort towards centralization modified by a recognition of local autonomy.

We have shown in the first place that the diversity of duties before such organizations is such that it is impossible for one organization to undertake them all. They will have to be entrusted to separate organizations. An effort should be made to consolidate and develop existing organizations, adding new ones when necessary. In our opinion the International Commission of Agriculture should undertake more especially to study questions of a technical and scientific nature. The International Confederation of Agricultural Syndicates should deal with cooperation in Agriculture. Special organization should be formed for the sale of the several farm products.

But if this scientific distribution of work between several distinct organizations is not to be hindered by serious drawbacks, it would seem essential to create a central organization representing all the great forces which aim at special purposes. On the one hand all national federations of agriculture should be affiliated to such a Center, and on the other all international agricultural organizations formed for special purposes. By this means, this great central organization for the agriculture of all countries could exercise considerable influence on the respective governments on farmers and on the world as a whole.

The great international confederation of farmers of which we dream should be based on foundations so broad that all organizations of practical men and scientific institutions could be represented therein. It would therefore be advisable that in countries where the several organizations are not all grouped in a Union, as is the case in Switzerland, said organizations should be able to secure direct representation on the International Confederation.

It would also seem to us highly desirable that this central confederation should try to enter into relation with the International Institute of Agriculture and that its General Assemblies should, if possible, be held in Rome at the same time as those of the Institute or immediately afterwards. This would offer the advantage that the Institute would probably gradually lose the strictly official character to which it has rigidly adhered hitherto.

The International Institute of Agriculture would thus be in a better position than now for cooperating with those for whose prosperity it was established, and on the other hand the farmers would understand better the valuable help which the Institute affords them. Indeed, the New Central Organization of Farmers would be in a position to derive great help in its practical endeavors from the enquiries undertaken by the Institute in Rome in a spirit which is both impartial and strictly scientific.

It is certain that the consideration in which agriculture is held in national life and by governments would be greatly increased by the establishments of an international farmers' central confederation. Undoubtedly, the farmer would no longer be subject to surprises such as that which the measures of the Versailles Treaty on the International Labor Bureau reserved for him.

On the other hand, it would seem that this new organization is quite essential to enable farmers to hold their own with the working classes, who for a long time past have possessed such an organization. Lastly, it is certain that the existence of such an international confederation would enable the farmers of each country to play a much more effective part than heretofore in the field of national economy. Of course, I am aware that the realization of the ideals above set forth will meet with many difficulties and run counter to deep rooted prejudices. Nevertheless, these ideals claim the attention of all who know the present situation and condition of agriculture, and nothing can prevent them from going forward until such time as they shall secure realization, and the more they are discussed the more rapidly they will be realized.

REVIEWS

Rural Education. By Arthur W. Ashby and Phoebe G. Byles. A study of Oxford County, England, conducted in 1920 under the auspices of the Oxford National Education Association and the Horace Plunkett Foundation: Oxford University Press—New York Branch. 1923. 250 pp.

"Oxfordshire has been described by one of its inhabitants as the county with a centre of light and learning surrounded entirely by outer darkness." "No observer can fail to mark the contrast between the busy religious, intellectual, aesthetic, and social activities of the (Oxford) University, city, and the apparent stagnation of most of the villages in the county, even of some within a few miles' radius of Oxford."

Such is the gloveless handling of the agricultural people of an English county as old as any part of England, by Professor Arthur W. Ashby, of the Institute for Research in Agricultural Economics, Oxford University. In the Preface of the book, Dr. A. L. Smith, Master of Balliol College, Oxford University, in similar candid vein, says, "Oxfordshire is peculiarly well fitted for such a survey (as this study makes). It is a county with no large towns and no important industry but agriculture. It has a distinctive and rather inferior type of population, originally from Wessex, but with a considerable survival of Celtic and even pre-Celtic elements, with an unpleasing dialect."

This study is especially significant for American farm economists in the fact that the interpreter, Professor Ashby, an agricultural economist, (formerly a student of Dr. H. C. Taylor's at Wisconsin University) has thought it within his legitimate province to look over all the environmental conditions surrounding children and adolescents as well as adults, in this farming county. Notice the range of topics chapter by chapter in Part I on Elementary Schools; Origin, Ownership, Control; Buildings and Equipment; Staff; Curriculum; External Influences, Health, Conduct; Continued Education; Economic Condition, Health and Physique; Provision for Children's Physical Welfare. In Part II on Adolescents and Adults we find a chapter on Evening Schools and Technical Instruction; and a chapter on Adult Education and Social Recreation.

Professor Ashby thinks that the agricultural people over a great part of England are "losing the characteristics of the peasant mind." He holds by the idea of the retention of "a comparatively small agricultural population with a fairly high standard of material equipment for personal life" "to assist in maintaining the physical standard of the nation."

The broad, fair, objective treatment of the human influences surrounding farm life in this English county will interest any American student of farm life who reads it. Historical method, psychological analysis, much quotation from Oxfordshire farmers, teachers and clergy characterize the 250 pages of this handy volume.

C. J. GALPIN.

Bureau of Agricultural Economics.

Cooperative Marketing of Farm Products. By O. B. Jesness, Lippincott's Farm Manual Series. Philadelphia: J. B. Lippincott Company. xiii, 292 pp.

Cooperative Marketing. By Herman Steen. Garden City: Doubleday Page & Company. 1923. 366 pp.

This book offers a general analysis of the organization and operation of cooperative central marketing associations in the United States. In the words of the author, it "aims to point out the fundamental principles of cooperative marketing among farmers; to indicate, by reference to typical instances what is being accomplished in the handling of various commodities, and to discuss methods and forms of organization, financing, incorporation, position under the anti-trust laws, and related questions." The subject is developed by the analytical-descriptive method. Thus, somewhat more than one-half of the book is devoted to a discussion of representative organizations marketing different types of farm products. The remainder contains an analysis of specific marketing and organization problems.

Emphasis is given throughout to the form of organization of central cooperative marketing associations in the United States and Canada and special consideration is given to the fundamental differences between the different types. In this

connection, the author takes issue with the proponents of the centralized type of association by pointing out repeatedly the necessity of organizing big associations from the ground up with the local associations and membership as a foundation for the cooperative structure (p. 41). This, it should be noted, is quite contrary to the point of view of Steen in his *Cooperative Marketing*, and of certain other cooperative leaders who would eliminate the local entirely for organizations marketing staples, and reduce it to an impotent advisory body for associations marketing perishables. Professor Jesness recognizes the weakness of the local in controlling quality, controlling movement to market and the like, that are emphasized by leaders of the centralized type of associations. He believes, however, that the local can assist the central in many ways, and that it can strengthen the marketing system by providing an active, interested, membership instead of a passive membership that is tied to the association by long-term contracts with many legal devices for enforcing them. One would infer from the discussion on p. 197 that the author believes the future central cooperative association will be a modification of the present extreme forms of federated and centralized organizations, with modifications to adapt them to market conditions.

One is somewhat disappointed in reading the book because of the extreme brevity of the marketing analysis, especially in view of the fact that the author has had such a wide experience with cooperative marketing. Only six pages are devoted to pooling, for example; no discussion of expense pools or storage pools is included; and only passing mention is made of such an important but difficult problem as controlling the flow of products to market.

The organization, and the author's clear, concrete style of presentation, makes the treatise an excellent hand-book for farmers and agricultural leaders. High schools should find it a useful text in agricultural marketing. However, there is scarcely enough marketing analysis to make it generally adaptable as a text for college courses.

Steen's *Cooperative Marketing* is a popular discussion of a popular subject prepared for farmers and agricultural leaders and describing about one hundred large cooperative associa-

tions. Unlike Jesness' *Cooperative Marketing of Farm Products*, it subordinates analysis to descriptive material. Moreover, it lacks a background of fundamental economics, as is indicated by its frequent repetition of popular misconceptions as to the functioning of the market. We are given to understand in chapter 27, for example, that all products are "dumped" (marketed) shortly after harvest, or the heavy producing season to the price disadvantage of producers.

There is no denying the fact that too large supplies are frequently thrown onto the market for the buying interests to absorb at a reasonable price. On the other hand, to generalize from such instances to include all products is dangerous. An analysis of potato prices during the period 1910 to 1921, for example, shows that the Minnesota producers marketed too few potatoes in the fall of eight years out of the twelve, with the result that spring prices were either lower than the fall prices, or not enough higher to cover costs of carrying. The most important fact to be noted in this connection is that during the four years of profitable storage the producers owned a smaller percentage of the stocks in store. This indicates that the growers have done a poor job of guessing when best to sell; but not that they have lost by "dumping" in the fall. Studies in agricultural prices have not progressed sufficiently to make similar generalizations with respect to other products, but it is safe to say that there are times when these farmers have not sold enough of their products in the fall.

But granting that the farmers and the locals are doing a poor job of feeding the market, what better method does the central associations expect to use? Will they guess when to sell, thus making one guess instead of many guesses? Will they forecast a price that will move the crop? Will they sell a given proportion weekly or monthly? These are perfectly legitimate questions for any producer or local to ask an agricultural leader who asks him to abandon the present method for a new one. Yet these are the kind of fundamental questions which Mr. Steen and too many of our agricultural leaders are leaving unanswered, asking the producer to abandon what he now has with a mere promise that the new system will give more orderly marketing.

The need for a new term other than commodity to designate the strong centralized associations is shown in this book.

Commodity organization and "marketing by commodity" are used interchangeably with much resulting confusion. The California Fruit Growers Exchange is said to be marketing "by commodity" since it controls about 70 per cent of the citrus fruits of California, although there is no better illustration of a federated organization in existence since it has locals, pools by locals, has the membership in the locals, and does not have long-term binding contracts with the growers, since a member may withdraw at the end of any year. Moreover, some of the locals decide when and where they will sell. This use of the two terms, therefore, throws all associations into the same class, even though many of them are the very opposite in form of organization from the centralized form described in the opening chapters. The result is that the accomplishments of federated and commodity associations are equally extolled when discussing individual organizations, and no constructive criticism of either type is made possible.

Exception should be made to the author's statement that "The Danes extended non-profit and commodity features until they had achieved commodity control, or true commodity cooperation," (p. 6). All available source material and conversations with Danish students of cooperation traveling in this country indicate that the Danish organizations are primarily of the federated type. The butter, bacon and egg marketing associations all have locals and producers are members of locals. The egg societies buy for cash, since this is the better basis for paying for quality. Moreover, the bacon factories, although they pool expenses and prices, do not pool the livestock on the basis of quality, but rather they pay the producer on the basis of the value of the finished product received from each animal. This corresponds much more closely to the American federations' method of buying for cash than the centralized associations' pooling of quality. The egg producers' contracts are for one year; the creameries have 5 to 10-year contracts, but many of them are revokable at the end of any year. As for the central associations being dominating factors in the central market, the evidence all points to the contrary. In 1914 there were seven cooperative butter export societies all together marketing 20.3 per cent of the total butter export; the largest bacon society exported only

25 per cent of the total export, and the one egg export society marketed less than one-sixth of the total Danish egg exports. In view of these facts, the claims of proponents of centralized cooperatives for Danish precedents are astounding.

The writer believes that we have enough general treatises on cooperative agricultural marketing. What we need now is special studies of marketing problems of cooperation. There has been something of a tendency among students of marketing to think that a separate body of principles applies to cooperative marketing as distinct from general marketing; but those of this mind are rapidly discovering that after all cooperative marketing is marketing by a particular type of organization, that the price and selling problems are similar, and that it is to students in these fields that cooperatives must look for solution of most of their real problems.

H. BRUCE PRICE.

Minnesota State University.

Farm Management. By W. J. Spillman. New York: Orange-Judd Publishing Company. 1924. 459 pp.

Doubtless the most important single contribution of this newest book on Farm Management, by one of the founders of that science, is the full and comprehensive discussion of agricultural geography, or types of farming. The introductory chapter considers the problem of capital in farming. The next twelve chapters, or about half of the book, are devoted to discussions of types of farming. After a consideration of the extent of various farm enterprises in the United States, the author discusses the types of farming in the important agricultural regions of the United States, and the factors influencing them. Each of the important farm enterprises is then discussed in some detail, including in the case of the more important cereals a brief consideration of the distribution of world production as well as a more detailed discussion of the distribution and trends of production within the United States. In the discussion of hogs and other animal enterprises a large amount of useful information is given of feed requirements, relative profitableness of different rations and cost of production, but little analysis of the relation

of hogs or other animals to farm organization in different regions. The point of view is descriptive rather than economic analysis.

Six chapters are devoted to farm organization—one to financial organization, one to physical organization or farm layout, and the remaining four to business organization. Size of farm business is the only factor of farm business organization that is discussed in detail. The application of other principles of farm business organization is treated incidentally in the discussion of farm organization in New England, in the cornbelt and in the cotton belt.

Chapters on tenure, diminishing returns and marketing constitute the remainder of the book. The author's work on the application of the principle of diminishing returns to agriculture is one of the most interesting parts of the book. Further reports on the progress of this work are promised.

The typography of the book leaves much to be desired. The lack of rules and of leads in tables makes them difficult to read and detracts from the appearance of the work.

The name of Spillman has been closely connected with the development of the science of farm management since the earliest beginning of the subject. It is good to know that after a short absence in journalistic work Dr. Spillman is back in farm management research where his active and resourceful mind will continue to stimulate other workers in this field.

W. I. MYERS.

Cornell University.

The editor of the *Journal* received a letter from Mr. A. Gordon Skinner, Agricultural Editor of the *Ontario Agricultural College Review*, published at Guelph, Ontario, requesting permission to publish Prof. H. E. Erdman's article "The Commodity Cooperative Association—Its Strength and Weakness" in the next issue of the *Review*.

The article on The Use of "Pars" and "Normal" in Forecasting Crop Production, by W. F. Callander and Joseph A. Becker, published in the October issue of the *Journal*, has been translated into Spanish for distribution in Argentina.

AGRICULTURAL ECONOMICS

RECENT PUBLICATIONS

Compiled by Mary G. Lacy, Librarian, Bureau of Agricultural Economics, U. S. Department of Agriculture

CANADA. Dept. of the Interior. Natural resources intelligence branch. Agricultural loans. Ottawa, printed by F. A. Acland, 1923.

"Legislation has been passed in practically every province of the Dominion providing a system of short and long term credits at reasonable rates of interest, generally upon the security of the land. In this bulletin an endeavor has been made to supply ready and intelligible information to the agriculturist by setting out in a clear and concise manner the regulations adopted in each province respecting rural credits." Preface.

GRAY, L. C. Introduction to agricultural economics. New York, The Macmillan co., 1924.

This volume is designed "to provide a text-book in agricultural economics suitable for the use of beginning students and . . . also adapted to the needs of the large class of general readers whose interest in the economic problems of agriculture is being awakened." Preface. The book covers the important phases of agricultural economics with reasonable completeness while some chapters are devoted to the subjects commonly included in the field of farm management.

GREAT BRITAIN. Ministry of agriculture and fisheries. Committee on agricultural credit. Report of the Committee on agricultural credit. London, H. M. Stationery off., 1923. (Parliament. Papers by command. Cmd. 1810.)

A comprehensive survey of the credit facilities available for agriculturists of Great Britain and a plea that agricultural interests should not be led to believe that in easily obtainable credit there lies a panacea for the ills from which agriculture is suffering.

GREAT BRITAIN. Ministry of agriculture and fisheries. Committee on distribution and prices of agricultural produce. Final report. London, H. M. Stationery off., 1923. (Parliament. Papers by command. Cmd. 2008.)

This committee was appointed to seek means by which the disparity between the price received by the producer and that paid by the consumer could be reduced. There have been interim reports published on milk and milk products, fruit and vegetables, meat, poultry and eggs, and cereals, flour and bread.

INTERNATIONAL LABOUR OFFICE, Geneva. *Enquête sur la production* v. 1. Paris, Berger-Levrault, 1923.

This is the first volume of four which are to summarize the results of the inquiry into production made by the International Labour Office. Twenty-seven governments replied to the questionnaire sent out and the resulting volumes should be valuable. This first volume in addition to some introductory statistical chapters dealing generally with the relation between price movements, production, and employment in a number of countries during and since the war, is devoted chiefly to setting out the method of the inquiry. The statistician who has to deal with international comparisons may find in the replies to questions inquiring as to sources of data much useful information on sources of information on production, stocks, consumption, and the basis on which index numbers are compiled in different countries. Adapted from *Economist* (London).

JESNESS, O. B. *The cooperative marketing of farm products*. Philadelphia, London, etc., Lippincott, 1923.

This work undertakes to point out the fundamental principles of cooperative marketing and describes the actual marketing of grain, butter and cheese, milk, livestock, fruits and vegetables, cotton and tobacco, wool, poultry and eggs. The legal aspects of cooperative organization are given and the actual texts of agreements and contracts used in certain organizations are included.

LLOYD, E. M. H. *Stabilisation; an economic policy for producers and consumers*. London, G. Allen & Unwin, Ltd., 1923.

The interest of this volume for agricultural economists lies in the discussion of the international control of raw materials and foodstuffs, and its monetary implications.

MORSE, H. M., AND BRUNNER, E. D. *The town and country church in the United States*. New York, George H. Doran company, 1923.

This survey is illustrated by data from 179 countries and by intensive studies of 25. It summarizes the results of the town and country survey of the Inter-Church World Movement so far as they were available.

NORDEN, ARTHUR. *Weltwarenhandel, märkte und berichterstattung*. Leipzig, Gloeckner, 1923.

This second edition, revised by Hans Hirschstein, should prove useful to those who wish to acquaint themselves with the organization and technique of the trade in grain, cotton, wool, sugar, and coffee. The purpose of the work is to make intelligible to the layman the commercial reports which appear in the press and to show the journalist how they are drawn up. *Economist* (London).

NEWS NOTES

A. B. GENUNG, Associate Editor

The Agricultural Economics Section of the Iowa Experiment Station is conducting a general economic survey of the creameries of Iowa. The purpose of this study is to determine conditions necessary to success and the causes of failure of the local associations and to describe and set forth the functions of these institutions and their relationships to the dairy industry as well as to agriculture as a whole.

The Taylor-Hibbard Club, founded a year ago by the graduate students in the department of agricultural and land economics at the University of Wisconsin, has been having another very successful year. The membership this year includes about twenty-five men from thirteen different States and Canada. Meetings are held on Friday evening of each second and fourth weeks of the month. The men gather for a cafeteria supper and have an interesting half hour of informal discussion and chats. This feature of the club is considered an important factor in its success. After the meal a special speaker is introduced and an instructive hour of discussion and questions follows. The officers of the club for the year are Grover G. De Vault, chairman; Geo. F. Johnson, secretary, and John F. Page, treasurer.

A course in Agricultural Business will be given during the next academic year at Iowa State College by Agricultural Economics and Rural Sociology Department. This course is designed to meet the growing demand for training in such activities as cooperative marketing of agricultural products, rural banking, and other businesses closely associated with agriculture as well as to fit for research and teaching in this field. Sufficient work in agricultural science and technique is provided to give the student a scientific view of the industry.

Two other courses will also be offered, namely, Farm Organization and Management, and Rural Sociology.

On February 12 the Iowa Chapter of the American Farm Economic Association was formed. Any member of the American Farm Economic Association who resides in Iowa is considered a member.

The officers are as follows: Dr. C. L. Holmes, President; Professor Geo. H. Von Tungeln, Vice President, and Professor Paul L. Miller, Secretary-Treasurer.

Quarterly meetings will be held.

Cost accounting at Purdue University is a required subject of all Sophomores in Agriculture. This offers an opportunity for the Department of Farm Management, through a system of cost accounts, to keep in touch with those who return to the farm after graduation. As a beginning, four sets of cost accounts are being opened this year, and the data collected will be used largely for class room purposes.

The Farm Management Department of Purdue University, in cooperation with the Bureau of Agricultural Economics, is making a study in Wayne County, Indiana, for the purpose of adjusting production to meet home market demands.

"Agriculture in Jennings County," by Lynn Robertson, is an Extension Bulletin just off the press. It is the product of the Extension Departments at Purdue in cooperation with local committees consisting of farmers and city business men in Jennings County. It analyzes in detail the weaknesses of farming in that section of the State, as brought out by a survey. It offers a definite program for 1923-1924, by months, for poultry, dairy, animal husbandry, soils and crops, and home economics.

Cap E. Miller reports an Economic Seminar Group at the North Dakota Agricultural College. He writes:

"We meet at 4 P. M. Friday during the winter and spring terms. We have no formal organization but a number of our members are subscribers to the *Journal of Farm Economics*. Last June five of our members received M. S. degrees from this institution. Three of the five men are now working for a doctor's degree at the University Farm, St. Paul, under the supervision of Dr. Black. We plan to send out five more men of this group with M. S. degrees this coming June. This local plan has been in operation for three years and it is growing more popular all the time."

In cooperation with the Division of Country Life Studies of the U. S. D. A., Dr. W. E. Garnett and Prof. R. C. White,

of the Department of Rural Sociology at Texas, have undertaken to study the housing situation of one thousand rural homes, and have the field work half completed. It is hoped that this study will furnish the basis for a rural housing code, for which a need is felt on account of the feeling of unrest in regions where tenancy is high, and also on account of the large number of pioneer homes that will probably be replaced in Texas during the next 25 years.

P. K. Whelpton has resigned as Professor of Farm Management at A. & M. College of Texas to join the staff of the Scripps Foundation for Research in Population Problems, at Miami University. His work will deal with the agricultural phases of the support of population.

The division of farm management of the University of California has completed a survey of the cost of producing beef on commercial ranges of 32 ranches. The study is grouped to include calves, yearlings, twos, threes and older. In addition to a determination of actual costs, the unit factors involved in production have been worked out together with suggestions for increasing profits from beef production.

A study is now being planned to determine costs of work-horse labor on California farms. A considerable number of records has already been taken and when these are supplemented with additional findings from fruit farms the results will be ready for assembling and analyzing.

Manuscript dealing with the cost of producing milk on 246 California dairies is now on the press and will be ready for distribution within a few days.

A manuscript on California farm tenancy is also being printed and will be distributed early in the spring.

Professor E. F. Dummeier is engaged in a study of the causes of success and failure of cooperative marketing organizations in the State of Washington. He is preparing a bulletin which will set forth the fundamental principles of cooperative marketing.

Professor Fred R. Yoder is engaged in a study of rural life at its best in the State of Washington. The investigation is being made in cooperation with the Division of Farm Life Studies of the Bureau of Agricultural Economics. The aim of

this investigation is to show some of the best things that have been accomplished in the State of Washington in the way of rural housing, rural community organization, rural schools, rural churches, and the best cooperative relationships between town and country communities.

Mr. W. W. Armentrout from the University of Tennessee, has been appointed Marketing Specialist for West Virginia. Mr. Armentrout began work in West Virginia about the first of this year, and will do extension work in Marketing until the beginning of next year, when he will give about one-half time to marketing investigational work, and the remainder of his time will be devoted to teaching.

The University of Delaware, through its agricultural extension service, has completed a farm management survey of the Seaford area, Sussex County. In this area, the type of farming is a combination of truck growing and poultry raising, with the grain crops as the minor enterprises. A preliminary report will be published in a few weeks.

The scientific staff of the Minnesota experiment station is devoting a series of five or six meetings to discussions of economic questions. Some of the topics treated to date are: "Changes in the Value of Money and Their Causes," and "The Control of the Business Cycle." Future discussions cover "The Present Significance of the Law of Supply and Demand," "The Principle of Comparative Advantage," "The Problem of Feeding the Market," and "Wages in City Industries, Their Courses and Consequences." These discussions are led by members of the agricultural economics division and members of the staff of the school of business.

Professor George A. Pond of the Division of Agronomy and Farm Management, University of Minnesota, and Jesse W. Tapp, Bureau of Agricultural Economics, are authors of Minnesota Bulletin No. 205, entitled, "A Study of Farm Organization in Southwestern Minnesota." This bulletin gives a very comprehensive report on the unit requirements of corn, oats, alfalfa, clover, hogs, dairy cattle and work horses. Complete illustrations of how data of this kind may be applied to the

problem of making farms more profitable in that locality are contained in the bulletin.

Dr. H. B. Price of the Division of Agricultural Economics, University of Minnesota, has been cooperating with the Tariff Commission in a study of the Cost of Marketing Wheat in the United States and Canada.

Mr. Ernst Wiecking is making an investigation of the factors affecting urban land values for the National Transportation Institute, basing his analysis on Minneapolis and St. Paul.

One of the most interesting members of the group of graduate students in Agricultural Economics at the University of Minnesota is Mr. Percy Lowe who lost his sight in a blasting accident two years ago. In spite of his handicap he has made as good a record in scholarship as any of his associates and has carried nearly a full program. The State Department of Education, Division of Civilian Rehabilitation, is assisting him to the extent of hiring readers for him in his various courses. Mr. Lowe expects either to teach or to do extension lecture work.

Ten of the members of Professor Mudgett's course in Theory of Statistics are working out their multiple correlation problem with land settlement data obtained by the Division of Agricultural Economics at Minnesota in cooperation with the Bureau of Agricultural Economics.

The University of Minnesota is offering a full summer quarter of graduate work in Agricultural Economics this summer. Courses will be offered in Marketing, Prices, and Production Economics. A special survey course in Agricultural Economics is being offered to teachers of Agriculture in Minnesota high schools. The School of Business is offering a full summer quarter of work in Economics, including courses in Value and Distribution, Money and Banking, Transportation, Corporation Finance, Business Cycles, Commercial Policies, Public Finance, and Accounting.

F. F. Elliott, formerly Farm Management Demonstrator in Illinois and who spent 1922-23 in graduate study at Harvard, is at Wisconsin this year continuing his studies in agricultural economics.

Dr. Paul Eke, who received his Doctor's degree at the University of Wisconsin last June, joined the Agricultural

Economics staff of the University of Illinois in September. Dr. Eke is instructing in marketing and land economics.

Mr. T. Hornung, graduate of the University of Nebraska, is employed on the cooperative hog cost investigations being conducted in Illinois by the U. S. D. A. and the University of Illinois.

A conference of managers and directors of Virginia's cooperative milk marketing associations was held in Harrisonburg, March 6, under the direction of the Agricultural Economics Department of Virginia Polytechnic Institute. About 30 men discussed at this conference their common problems, having to do with their relations with dealers, members and with each other.

Several farm accounting demonstrations have been given recently for the first time in Virginia by the Agricultural Economics Department of Virginia Polytechnic Institute. Several hundred farm accounts are now being kept by Virginia farmers, which will be summarized and made available to the farmers of the State by the V. P. I. Extension service.

Individual statements showing the financial returns obtained by 300 farmers in Appomattox and Pittsylvania Counties, Virginia, will be carried back to the farmers by the Agricultural Economics Department of Virginia Polytechnic Institute. At the same time local meetings will be held and the significant results of the farm management survey will be presented and discussed. These two counties represent typical dark and bright tobacco districts, respectively.

Professor J. J. Vernon of the Virginia Agricultural Experiment Station, is making a farm organization study in two typical tobacco growing districts—one for dark and the other for bright tobacco—covering the year ending March 1, 1923.

Mr. George Knutson, who has been engaged in cooperative farm accounting work with the Bureau of Agricultural Economics, U. S. Department of Agriculture, and the Department of Economics and Sociology, at the Colorado Agricultural College during the past two years, has accepted a position as agriculturist with the Union Pacific Railroad. He will have charge of agricultural work on the Salt Lake-Los Angeles line and will be located in Salt Lake City, Utah.

The Department of Economics and Sociology in the Colorado Agricultural College is planning to make a farm organization, farm management and cost of production survey on a limited number of farms in the vicinity of Pueblo, Colorado, beginning the 7th of April. A number of farmers engaged in the dairy business in the Pueblo area have been insisting upon a survey of their work in order to secure information which will enable them to make constructive adjustments and thereby derive greater profits from the business.

President Bradford Knapp of the Oklahoma A. and M. College, is teaching a course in the Department of Agricultural Economics entitled, "Extension, Organization and Methods." This course is offered to Juniors and Seniors in the Schools of Agriculture and Home Economics.

S. H. Hobbs, Jr., of University of North Carolina, was elected President, and C. E. Allred, of University of Tennessee, was elected Secretary, of the recently organized "Southern Association of Economists and Sociologists." The organization was effected at a conference called by President Futrall, of University of Arkansas, and held at the Tutwiler Hotel, Birmingham, Alabama, on February 15-16. The object of the conference was, and of the new organization is, to pool the resources of the research organizations engaged in the study of economic and social problems in the South, to the end that more rapid progress may be made in finding the best solution to these problems. Another conference is to be held at the University of Tennessee in October, 1924.

A conference of the Agricultural Committee of the Tennessee State Bankers' Association and of the staff of the Tennessee Agricultural College, was held at the University of Tennessee, Knoxville, on March 10, 1924. The meeting was called by Professor D. H. Otis, Chairman of the Agricultural Commission of the American Bankers' Association. A program was outlined whereby the bankers are to assist the extension service in developing certain phases of their program during the present year. Some of the largest bankers of the State were present and showed great interest in agricultural improvement.

Detailed cost of production studies have been carried on in North Dakota for five years. Data for 1922 covered 73 farms well distributed over the State. In 1923, 70 records were kept, 24 of which were on the cost route in Cass County. These data are being assembled and tabulated preparatory to publication. About the same number of cooperators are being carried in 1924.

Mr. Guy G. Gardner, assistant in the department of farm management at North Dakota Agricultural College, has been conducting some farm account schools which have seemed to be well received, even in these hard times.

Mr. Edwin Mayland, who was formerly head of the department of farm management at North Dakota, has been temporarily employed during the recent months in the preparation of some farm reorganization plans in three sections of the State based upon the results of the cost studies.

The farm management department conducted a farm credit survey covering every farm in three townships in Foster County, North Dakota, in December, 1923. One hundred and six complete records were obtained showing the present organization of the farm as to crops and livestock and income from various sources, assets and liabilities. Net worth was used as the measure of conditions. It was found that the appraised value of land on the basis of Federal land bank appraisals was \$35 per acre and that the mortgage liabilities amounted to approximately \$18 per acre. The results of this study are published in North Dakota Experiment Station Bulletin 175.

Mr. C. E. Lively, Department of Rural Economics, Ohio State University, in cooperation with the Home Economics Department has prepared a household account book which will be kept, under supervision, as a project in several counties of the State.

Mr. C. H. Stackhouse has been placed in charge of the cost accounting route in Medina County, Ohio, taking the place of Mr. W. F. Weaver who resigned.

A Department of Agricultural Economics was established in the College of Agriculture, University of Maryland, in 1922, with Dr. S. H. De Vault as head. During the college year,

1923-4, one hundred and thirty students have been enrolled in the courses in Agricultural Economics. Several students are majoring in the department.

Mr. C. H. Schopmeyer of the Office of Cooperative Extension Work, U. S. Department of Agriculture, is taking work in Agricultural Economics for the M. S. degree at the University of Maryland. His thesis, which has been completed and published as a bulletin by the Federal Board for Vocational Education, Washington, D. C., is entitled "Analysis of the Management of a Farm Business."

Mr. Leonard Kemp, a student in Agricultural Economics at University of Maryland, has just completed an economic and social survey of Prince George's County, Maryland.

Dr. S. H. De Vault, Professor of Agricultural Economics, recently made a survey of the wheat situation in Maryland, the results of which have been published in a bulletin, entitled "The Marketing of Wheat in Maryland."

A department of agricultural economics has been established at the State College of North Carolina. This department is in the new school of General Science. G. W. Forster, formerly acting chief of the Office of Farm Management, Washington, D. C., was elected head, September 1, 1923. A complete research program has been worked out and approved by President Brooks.

A study relative to the home marketing demand for agricultural products was recently completed. This project was for the purpose of determining the demand for agricultural products by the city of Fayetteville, Cumberland County, N. C. It was found that approximately \$200,000 worth of products which could be produced in the community had been shipped in, largely from other States. A program embodying suggestions whereby the farmer could take advantage of his home market was made for the farmers of Cumberland County.

Mr. De Forest Hungerford, who has been connected with the Georgia State College of Agriculture as Extension Farm Management Specialist, resigned on February 1, to take the position of county agent of Coweta County, Georgia. Mr. Hungerford has been with the Agricultural College in this capacity since 1918.

Mr. J. F. Booth, instructor in the department of Agricultural Economics and Farm Management at Cornell, was on leave of absence during January and the early part of February, assisting the United States Tariff Commission in the study of wheat costs in Western Canada. Mr. Booth was formerly Commissioner of Markets in the Province of Saskatchewan.

Dr. C. E. Ladd of Cornell, participated in the program of the Minnesota Farmers' Week early in January.

Mr. H. S. Gabriel has returned to his position in the National Transportation Institute at Washington after spending the past term in graduate work at Cornell.

Cornell is again planning to offer an attractive group of graduate courses during the summer session from July 5 to August 15, 1924. Dr. T. N. Carver of Harvard, will offer two courses, one in Agricultural Economics and one on Population and Food. Dr. Pearson will offer two courses in Prices. The course in Public Problems will again be continued with a different list of nationally known speakers. There will also be a course in Marketing given by Dr. C. E. Ladd and a course in Farm Management by Dr. W. I. Myers.

New Mexico had its prosperous as well as its non-prosperous agricultural sections in 1923. The average labor income of 15 farmers in Dona Ana County, who turned in farm account books for summarizing, was \$2,360. Five of the 15 made labor incomes of over \$3,000 and eight made labor incomes of over \$2,000. Cotton, alfalfa, dairying and cantaloupes were the money-producing enterprises, cotton being the big money crop.

Current officers of the Agricultural Economics Club at the Kansas State Agricultural College are: President, M. M. Williamson; vice-president, B. J. Miller; secretary, C. D. Tolle, and treasurer, O. M. Williamson.

Four additional bulletins by J. O. Rankin have been issued in the socio-economic survey of Nebraska farm tenure.

A. W. Medlar has summarized the results of two 1922 crop-year surveys in Nebraska. A survey made in the south central part of Nebraska included 26 farms on which wheat was

the main crop. Their average receipts were \$2,278, expenses \$1,262, and labor income minus \$267. The ten best farms from the standpoint of labor income had \$2,368 average receipts, \$965 expenses, and \$308 labor income. The other survey covered 79 farms in the irrigated districts near Scottsbluff in the extreme western part of Nebraska: 22 farms with investments averaging \$10,235 had farm incomes of \$549 and labor incomes of \$48 and 32 with an average investment of \$19,350 apiece had farm incomes averaging \$373 and labor incomes averaging \$402. Eight farms with an average investment of \$41,200 had farm incomes averaging \$4,318 and labor income of \$2,258. The 79 farms averaged \$1,520 in farm income and \$470 in labor income.

"The Purchasing Power of Nebraska Grains" is the title of Bulletin 187 by H. C. Filley and E. A. Frerichs. The latter was once a graduate student in the Department of Rural Economics. This study was based largely or altogether upon (1) grain prices paid at Columbus, Nebraska, 1877-1922, and (2) U. S. Bureau of Labor data.

E. L. Taylor, Nebraska State Extension Agent in Farm Management, has been holding farm account schools and has secured a sufficient number of farm account cooperators to insure summarizing schools in five counties. Scotts Bluff County is undertaking to secure 100 sugar beet records. Equally large numbers of corn and oats enterprise records are being sought in some other counties. Much interest is shown in hog cost records.

Dr. H. C. Taylor, Chief of the Federal Bureau of Agricultural Economics, accompanied by J. A. Becker, Statistician, and G. C. Edler, Specialist in Seed Marketing, will sail from New York on April 18 for Rome to attend the sessions of the International Institute of Agriculture, May 2-10. Edward A. Foley, the Bureau's Agriculture Trade Commissioner, stationed at London, will also participate in the institute sessions.

Dr. Taylor and Mr. Becker will also attend the International Cotton Congress to be held at Vienna, June 12-14, after which Mr. Becker will make a study of the crop-reporting methods in use in various European countries. Mr. Edler will take part in the International Seed Testing Congress, at Cam-

bridge, England, July 7-12, in addition to investigating the movement of certain kinds of seed between European countries. Although Mr. Edler has a fairly full program, he will nevertheless be glad to receive suggestions regarding the kind of seed information that would be of greatest value to the industry in this country.

In the January issue of the Journal Mr. I. D. Lewis, of Clemson College, is mentioned as State Representative from South Carolina. This is an error as Ward C. Jensen will continue as State Representative.

Prof. F. A. Buechel, Head of the Department of Agr. Economics at A. & M. College, of Texas, is the State Representative for Texas. Prof. Whelpton, whose name appeared in the January Journal as Texas representative, has resigned from the staff at that college.

On page 98 of the January issue the name De Witt C. King appeared as discussing Prof. Falconer's paper, the name should be De Witt C. Wing.

Prof. W. I. Myers, of Cornell University, writes:

"I have recently sent out a circular letter to all county agents and teachers of agriculture in high schools of the State and have obtained a considerable number of new members for the association. I imagine we will have fifteen or twenty new members from this State altogether and if some of the other States can do as well, the association can maintain the present size of its Journal."